PROJECT SPECIFICATIONS

for the

BUILDING 154 RENOVATIONS FOR CST/WMD

ARMY AVIATION SUPPORT FACILITY
WINDSOR LOCKS, CONNECTICUT

Prepared By

CONNECTICUT ARMY NATIONAL GUARD
FACILITIES MANAGEMENT OFFICE

360 Broad Street, Hartford, Connecticut

Tracking No. AA0401

July 30, 2004

TABLE OF CONTENTS

SUPPLEMENTARY GENERAL CONDITIONS

01006 ARCHITECT OR ENGINEER

The Architect or Engineer is defined in The General Conditions.

01008 AGENCY

The Agency is the National Guard Bureau, U.S. Property and Fiscal Office for Connecticut.

01010 CONSTRUCTION ADMINISTRATOR

The person or firm designated by the Agency for administration and coordination of field construction activities.

01011 PROJECT MANAGER

The person designated by the Agency to coordinate Agency reviews of submittals, inputs of the Agency re preferences / problem resolutions, information request responses and participation in project meetings, inspections, tests and other acceptance of work activities.

01012 SUMMARY OF WORK

A. Project No. AA0401 is the Renovation of Building 154 for the CST/WMD.

B. The project will be constructed on property to be owned by the State that is located at State Route 75, Windsor Locks, Connecticut.

01013 QUALITY ASSURANCE

A. No proprietary specifications are imposed by this specification but the State of Connecticut reserves the right to require from the contractor specific and technical data and demonstration of any material, system, assembly or piece of equipment proposed. Items, which the State will not accept, are listed in Divisions 2 through 16.

B. All building materials, systems, assemblies, equipment and all other components proposed for the building construction shall provide the best possible utility and longevity and represent the highest standards of craftsmanship, durability and quality. Each shall be appropriate for its use, manufactured by reliable and solvent companies, be commonly used and generally accepted in construction practices, be free of inherent or potential defects, be easily serviceable if required, be able to receive replacement parts if required, and be fully warranted.

C. The Agency shall make the final determination as to the suitability of any material, system, assembly, piece of equipment or any other project component and shall not accept in part or whole that which it deems unsuitable, inappropriate, or otherwise undesirable.

01014 OCCUPANCY

A. If the agency wishes to occupy a portion of the building before final acceptance, the Contractor shall complete work in the subject portion and make it available.

B. The Construction Administrator will determine whether the occupancy is possible and, if so, will make a job inspection with representatives of the Agency, the Architect and/or Engineer, the contractor, and the State agencies that will occupy the building.

C. Inspecting parties will agree on a punch list and the terms of the occupancy.

D. A letter from the Agency to the Contractor accepting occupancy will state the terms and conditions of occupancy and punch list items.

E. It shall be the responsibility of the Contractor to obtain the necessary Temporary or Partial Certificate of Occupancy and to complete the punch list items.

01045 ALTERATION OF WORK IN PLACE

A. The Contractor shall not allow any contractor or subcontractor to cut, alter, repair, or modify in any manner any structural component of the building without express written approval, modification drawings, and specifications from the Architect or Engineer.

01090 STANDARDS, CODES AND SPECIFICATIONS

A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. References to trade standard specifications and codes refer to the editions current on the effective date of the Contract. References include their addenda and errata, if any, and shall be considered a part of these specifications as if they were printed in full herein.

C. It shall be the sole responsibility of the Contractor to insure that the proposed building construction, building use, parking, access and all other aspects of the project are in total compliance with all the latest applicable federal, state and local codes, statutes, and guidelines. These may include but are not necessarily limited to:

1. State of Connecticut Basic Building Code
2. State of Connecticut Mechanical Code
3. State of Connecticut Plumbing Code
4. Any applicable BOCA Supplements or amendments
5. State of Connecticut Electrical Code
6. Connecticut Building Code Supplement
7. ANSI A1171, Handicapped Accessibility
8. Americans with Disabilities Act, ADA
9. Connecticut Fire Safety Code
10. NFPA referenced codes and regulations
11. ANSI A17.1, Safety Code for Elevators
12. State of Connecticut Wiring Standards for Data Processing and Telecommunications, Approved by BISDP/DAS
13. State of Connecticut DOT specifications for sitework
14. State of Connecticut DEP regulations for discharge of stormwater and dewatering wastewaters

15. ASHRAE/IES Energy Efficient Design Standards
16. State Traffic Commission Regulations
17. FAA Regulations for projects in approach zones

01210 PRECONSTRUCTION CONFERENCE

A. The Construction Administrator will organize a Preconstruction Conference.

01220 PROJECT MEETINGS

A. The schedule of regular project meetings will be established at the Preconstruction Conference.

01340 SHOP DRAWINGS

A. The Contractor shall submit to the Agency for review copies of all shop drawings, product data sheets, and samples.

01560 TEMPORARY CONTROLS

A. All temporary controls shall comply with all applicable codes, statutes, and regulations including but not limited to OSHA, EPA and USDA.

B. Temporary controls shall include but not be limited to dust control, noise control, pest control, rodent control, pollution control, traffic control, and erosion and sedimentation control.

01569 CLEANING

A. Maintain areas under Contractor's control in a clean and orderly condition, free of waste materials, debris and rubbish.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces before closing the space.

C. Periodically clean interior areas before start of surface finishing and continue cleaning on an as-needed basis.

D. Control cleaning operations so that dust and other particulars will not adhere to or damage wet or newly coated surfaces.

E. Remove waste materials, debris and rubbish from site in a timely manner to proper off-site locations. No scrap, waste, or debris shall remain inside the building or on site upon final acceptance of the project.

01610 TRANSPORTATION AND HANDLING

A. Materials and equipment shall be delivered, stored and handled to prevent intrusion of foreign matter, damage by weather, and breakage. Packaged materials shall be delivered and stored in original, unbroken packages.

B. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct and products are undamaged.

C. Materials and equipment showing evidence of damage may be rejected by the Project Manager, and shall be replaced by the Contractor at no additional cost to the State.

01620 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instructions.

B. For exterior storage of fabricated products, protect from damage by weather and other atmospheric conditions.

C. Store loose granular material on solid surfaces in a well-drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection by the State.

E. Stone, masonry units and similar materials shall be stored on platforms or dry skids and shall be adequately covered and protected against damage.

F. The Contractor shall prepare, when required by the State, one area or space in the building for storage of State owned equipment.

01710 FINAL CLEANING

A. The Contractor shall keep the premises free from accumulations of waste materials and rubbish caused by his employees and work or the employees and work of any of his contractors or subcontractors.

B. At the completion of the work, the Contractor shall remove rubbish and all temporary structures, tools, scaffolding, surplus materials, supplies and equipment which he or any of his subcontractors may have used. In case of dispute, the State may remove the rubbish, etc. and charge the Contractor for its removal.

C. Before final inspection, the Contractor shall clean all visible interior and exterior surfaces, remove temporary labels, remove stains and foreign substances, clean all equipment and fixtures, and replace filters on mechanical systems.

D. Remove waste and surplus materials, rubbish and construction equipment and facilities from the site.

E. Leave building clean and ready for occupancy. If the Contractor fails to clean up, the State may do so, and the cost will be charged to the Contractor.

01740 WARRANTIES AND BONDS

A. The Contractor shall guarantee all materials and workmanship for a period of one year from the date of acceptance of the work. In addition, the Contractor shall furnish other warranties and bonds as follows:

1. Equipment and Products - Manufacturer Warranties:

Sealant (Materials)	10 years
Overhead Doors	5 years
Finish and Door Hardware	5 years
Carpet	10 years
Plumbing fixtures	5 years
Compressors and Motors	5 years
HVAC Systems	10 years
Light fixtures, excluding lamps	5 years
Electrical Service Equipment	5 years

1. Workmanship and Installations

Sealants	5 years
HVAC Systems	2 years

B. Four copies of each document shall be submitted to the Construction Administrator.

C. Form of Bonds, Guarantees, Warranties:

1. All documents shall be assigned to:

Department of the Army
National Guard Bureau, USPFO for CT
360 Broad Street
Hartford, Connecticut 06105

1. All documents shall contain the project title and project number and shall be in a format acceptable to the Agency.

2. Bonds shall be issued by approved Surety Companies, assigned to the Agency.

2. Any guarantees, warranties or bonds supplied by Contractors, Subcontractors, Suppliers or Manufacturers shall be countersigned by the Contractor.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 4
SECTION 04200
UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

A. Provide unit masonry for walls and partitions:

1 Repair of existing construction

B. Provide representative samples of each type of masonry wall finish in sizes, types, and quantities as required by the State for approval and quality control.

PART 2 - PRODUCTS

2.01 MATERIALS

Brick:

1. Brick selected should be compatible with surrounding buildings and contribute to a unified expression for the installation.
2. Facing brick shall be Grade MW or SW (exterior locations) and Type FBX with a minimum compressive strength of 8,000-psi. The brick must meet the requirements of ASTM C 216. Absorption factor shall not exceed 7.0

B. Concrete Block: Normal weight ASTM C90 Type 1.

C. Facing Block: High density, low absorption concrete block. Style, color and surface texture as Selected to make existing.

D. Precast Concrete Coping, Wall Caps and Sills: 4,000 psi, light sandblast finish.

E. Mortar: ASTM C270, Portland cement-lime mortar. Type N above grade; Type M below grade; other types as required by application. Inorganic oxide mortar pigments, color as selected.

1. All mortar additives where required, must contain not more than 0.1% chloride ions and shall be certified as such by the Contractor.

2. All colored mortar must be pre-approved along with the brick colors.

3. Re-tempering of mortars is not allowed.

2.02 MATERIALS

A. Remove and replace damaged units. Enlarge holes in mortar and re-point. Prepare joints to receive sealants. Clean brick using bucket and brush method; comply with BIA Tech Note 20. Clean concrete masonry by dry brushing; comply with NCMA TEK No.28.

PART 3 – EXECUTION

A. All work shall be done in accordance with the NPS guidelines for masonry restoration and repair work.

B. No masonry work is to be done when the temperature is below 40 degree F or predicted to be below 40 degree F overnight, unless adequate protection against freezing is provided, and suitable means are provided to heat materials.

C. Brands of cementitious materials and the source of supply of sand should remain the same throughout the entire job.

D. Dry-brush exposed masonry at the end of each day's work.

E. Use of wire brushes, acids, or solutions, which might cause discoloration and/or damage to the factory-applied finish, is expressly prohibited.

END OF SECTION

DIVISION 5
SECTION 05500
METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide miscellaneous fabricated metal items.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reference Standards: The latest publication of the following standards shall establish the minimum requirements when not otherwise specified in the Section:

1. National Association of Architectural Metal Manufacturers (NAAMM), “Pipe Railing Manual.”

2. National Association of Architectural Metal Manufacturers (NAAMM), “Metal Bar Grating Manual.”

B. Steel plates, shapes and bars: ASTM A36

C. Steel bar grating: ASTM A569

D. Steel pipe: ASTM A53, Schedule 40

E. Bolts: ASTM A325

F. Fasteners: zinc coated

G. Grout: Non-shrink non-metallic type

H. Concrete inserts: Galvanized steel castings

I. Galvanized steel items exposed to weather: 1 coat shop primer, ready for field painting or shop painted.

1. Galvanizing: ASTM A525
2. Primer: Tnemec 10-99, PPG Inhibitive Metal Primer, Rustoleum Rusty Metal Primer or approved equal.
3. Galvanizing repair paint, zinc rich primer: Tnemec, PPG, ZRC Chemical Products or approved equal.
4. Ventilation shafts penetrating the roof shall be equipped with antipersonnel screening to prevent unauthorized access to the building.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 6
SECTION 06010
LUMBER

PART 1 - GENERAL

1.01 SUMMARY

A. Provide lumber to comply with the appropriate design and use.

B. Provide blocking for metal frame construction.

C. Provide blocking for all wall or ceiling mounted accessories and equipment

PART 2 - PRODUCTS

2.01 MATERIALS

A. All lumber is to comply with the design and service recommendations of the "National Design Specification for Wood Construction," by the National Forest Products Association.

B. All surfaces receiving finish shall be sanded, filled or otherwise prepared to receive paint or stain.

C. Wood stud framing shall be limited to infill construction in renovation.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISON 6
SECTION 06100
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

Furnish labor and materials to complete all rough carpentry work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials include lumber, grounds, and blocking with fasteners of size and type suited to the work. Use hot dip galvanized fasteners in concealed work and that is exposed to the weather. Provide a wood preservative injected into all lumber, ground, blocking after treatment lumber shall be kiln dried to a moisture content not to exceed 19%. This is for all pressure treated or fire retardant lumber.

B. Preservative treatment for wood shall be required for all wood in damp areas or in contact with earth, concrete, masonry, plaster or roofing.

C. Preservative and fire-retardant treatments of wood shall be accomplished by means of pressurization. Moisture content of preservative treated wood shall not exceed 15% prior to or after treatment.

D. All lumber must be inspected, marked according to grade and certified by the appropriate bureau governing that product.

E. Framing lumber shall be kiln-dried “S-DRY”, with moisture content not to exceed 19%.

F. Proper anchors shall be provided for window treatments.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 6
SECTION 06200
FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

1. Provide finish carpentry including standing and running trim and counter tops.
2. Provide interior architectural woodwork, including wood cabinets.
3. Provide wall storage system in Apparatus Bay.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Finish Carpentry
Materials and Fabrication: Conform to Architectural Woodwork Institute specifications for PREMUM quality work as a minimum.

B. Interior Architectural Woodwork

1. Cabinet Work: Materials and fabrication shall conform to Architectural Woodwork Institute specifications for PREMIUM quality work.

2. Cabinet hardware shall be furnished and installed by the cabinetry installer. Coordinate requirements for locking with Agency personnel.

C. Laminate: Material with color that goes through its entire thickness such as Colorcore, Grade 41, NEMA Type HW 62 by Formica Corporation.

D. Adhesives: Kopper G1149A/G1131B or Formica Brand #151.

E. Substrate: Fire rated particleboard or standard particleboard.

F. Backer: Formica BLS Grade 91 backer sheet.

G. Wall Storage System: 20”x 20” x 72” tall, High strength, ¼” cold rolled wire shelving system on 1-1/4” steel tube frame with steel mounting brackets, by Geargrid, or equal. Architect to select from manufacturer’s standard selection.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 7
SECTION 07720
ROOF ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide roof accessories:

1. Curb and equipment support units

PART 2 - PRODUCTS

2.01 MATERIALS

A. Curb and Equipment Support Units: Prefabricated 14 gauge galvanized sheet steel, ASTM A570

PART 3 - EXECUTION

3.01 INSTALLATION

A. All materials shall be installed in accordance with the manufacturers' recommendations and requirements.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 7
SECTION 07920
SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

A. All new joints between dissimilar materials (i.e., brick to metal, wood to brick) shall be sealed.

PART 2 - PRODUCTS

A. The use of one-part polysulfide, one-part polyurethane or silicone-synthetic rubber type sealants is preferable.

B. Exterior joints on vertical surfaces: Non-sag polyurethane; Pecora Dynatrol II or Tremco Dymeric or approved equal.

C. Seam sealant for small metal-to-metal joints; Tremco Seam Sealer or approved equal.

D. Pre-compressed expanding sealant tape; Emseal PC-SA or approved equal.

E. Fire-retardant sealant; 3M Barrier Caulk, CP-25 or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All materials shall be delivered to the job site in sealed containers with the original labels attached. Materials shall be used in accordance with the manufacturers instructions. Color of all sealants shall be selected from the manufacturers' standard color schedule and approved by the Owner.

B. Utilize fire rated sealants to maintain integrity of any rated walls when penetrated with conduits, piping etc.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 8
SECTION 08110
METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide steel doors.

B. Provide hollow metal doorframes.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel Doors: 1-3/4" thick seamless flush doors:

1. Interior doors: 18 gauge ASTM A366 or A568 cold-rolled steel.

2. Exterior doors: Insulated 16 gauge ASTM A526 steel with ASTM A525 G60 galvanizing. Provide solid top channel, without pockets.

B. Frames: welded construction mitered corners; with full width hinge reinforcing, gauge as follows:

1. Interior Frames: 16 gauge up to 5' wide, 14 gauge over 5’ wide.
2. Exterior Frames: 14 gauge.
3. Grout solid where possible.

C. Louvers: Sightproof, stationary type, 24 gauge cold-rolled steel in 20 gauge frames.

D. Finish: Rust-inhibiting primer.

E. Fire Rating: UL labeled, fire rated assemblies where required.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install per recommendations of the Steel Door Institute.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BANK

DIVISION 8
SECTION 08360
SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

1.01 SECTION REQUIREMTENTS

A. Submittals: Product Data.

B. Structural Performance: Design and reinforce sectional overhead doors to withstand a 20-lbf/sq. ft. windloading pressure.

1.02 COORDINATION

A. Coordinate door operation controls with owner. Shop drawings shall indicate controls for review prior to start at work.

PART 2 - PRODUCTS

2.01 SECTIONAL OVERHEAD DOORS

A. Remove existing door operators and provide new electrical with the manual override. Provide local and remote switches allowing for operation from door, from vehicles or from offices. Provide and install bottom strips on existing doors to reverse operation when obstructed. Provide a minimum of three hand held remote controllers per door

B. Operation: Electrical with manual override.

C. Tracks, Supports, and Hardware: Manufacturer’s standard.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install , operating equipment complete with necessary hardware.

B. Test and adjust controls and safeties.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 8
SECTION 08710
FINISH HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Provide finish hardware for new swinging doors.

PART 2 - PRODUCTS

2.01 GENERAL

A. Specifying hardware by allowance is prohibited. Hardware sets shall be developed for each unique condition for the building.

B. The Current Code requires that door handles be easily grasped by handicapped persons. This necessitates lever handles on virtually all doors. The exceptions to this rule are mechanical equipment rooms and other maintenance spaces such as janitorial spaces

2.02 MATERIALS

A. Hinges, Butts and Pivots: Full mortise, 5 knuckle ball-bearing type; Stanley, Hager or McKinney.

B. Locksets and Latchsets:

1. Heavy duty cylindrical (commercial and institutional): Corbin Russwin CL 3300 line or approved equal.
2. Heavy duty mortise type (commercial): Corbin Russwin ML 2000 Line or approved equal.
3. New door to be provided with latch set operation.

C. Lock Cylinders and Keying: Interchangeable core pin tumbler lock cylinders and nickel silver keys.

D. Bolts and Coordinators: Ives or approved equal.

E. Door Trim: Kick plates, armor plate, plastic plates; Brookline by Yale or approved equal.

F. Stops: Ives or approved equal.

G. Thresholds: National Guard Products, Inc. or approved equal. Provide threshold between all dissimilar flooring materials.

H. Finish:

1. US 32D, Satin stainless steel

PART 3 - EXECUTION

3.01 INSTALLATION

A. All materials shall be installed in accordance with the manufacturer's recommendations and requirements.

DIVISON 8
SECTION 08810
GLASS & GLAZING

PART 1 – GENERAL

1.01 SUMMARY

A. Provide replacement glass to repair damaged windows and to install glazing at locations where A/C units are being moved, and where existing glazing is damaged.

B. Glass Schedule.

1. Match existing adjacent glazing.

PART 2 – PRODUCTS

A. Glazing Sheets

1. Primary glass, Fed . Spec. DD-G-451
    a. Clear float glass

B. Glazing Materials

1. Silicone glazing sealants
    a. Structural Sealant: Dow Corning 795 or approved equal
    b. Weather seal: Dow Corning or approved equal

2. Polysulfide glazing sealant; Sonolastic 2 part; Sonneborn Building Products or approved equal.

3. Acrylic glazing sealant: Tremco Mono or approved equal.

4. Preformed glazing tape: Tremco Polyshim Tape or approved equal.

5. Glazing gaskets
    a. Lock strip gaskets: D.S. Brown CO or approved equal.
    b. Preformed gaskets: Tremco or approved equal

6. Setting blocks, shims and spacers as required.

DIVISION 9
SECTION 09000
FINISHES - GENERAL

PART 1 - GENERAL

1.01 SUMMARY

A. The following is a general guideline for flooring finishes in various locations. Unless otherwise noted, use these finishes for finished spaces.

Offices:	Carpet Tile
Seminar and Conference Rooms:	Carpet Tile.
Library and Reading Rooms:	Carpet Tile
Restrooms:	Ceramic tile, dark colored grout. Ceramic tile base should extend up walls at least 4”.
Classrooms:	Carpet Tile
Corridors:	Terrazzo or VCT. Carpet tile may be used on upper floors in buildings or in low traffic areas.
Lounges:	VCT or carpet tile.
Kitchens:	VCT, quarry tile or epoxy flooring.
Stairs:	Terrazzo or rubber tile.
Entrances and Vestibules:	Pedigrid/pedimat for recessed and on-surface areas (recessed preferred).
Lobbies:	Terrazzo, Porcelain tile, Stone or VCT.
Multi-Purpose Rooms:	Wood flooring or composite plank flooring.
Janitor’s Closets:	Ceramic tile with minimum 4” base and dark colored grout or epoxy flooring.
Apparatus Bays:	Hardened, sealed concrete.

B. Special attention shall be given to flame spread ratings of all finishes. All materials shall be specified with flame-spread requirements. Require the Contractor to indicate the actual ratings on all submissions.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 9
SECTION 09250
GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

A. Provide gypsum drywall work including metal support systems.

1. Interior walls, partitions.
2. Acoustic insulation, walls and ceilings.

B. Install access panels in drywall.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Gypsum Board:

1. Interior use: ASTM C36, 5/8" thick regular, water resistant, fire resistant and foil-backed types.
2. Exterior use: ASTM C931, 5/8" thick regular and fire-rated types.

B. Backer Boards: Glass mesh reinforced Portland cement backer board.

C. Steel Studs: 25 gauge, ASTM C645, spacing 16" o.c.

D. Ceiling Suspension and Furring Materials: Steel runners and galvanized hanger wire; stainless steel wire for exterior soffits.

E. Joint Reinforcement: ASTM C587 paper tape and ready-mixed vinyl compound.

F. Accessories: Galvanized steel corner beads, casing beads, control joints.

G. Acoustical Insulation and Sealant: Fiberglass batt cut to full center-to-center stud dimensions.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All materials shall be installed in accordance with the manufacturers' recommendations and requirements.

B. Provide acoustic insulation in new walls between all offices and other offices, break rooms and toilet rooms.

C. Provide acoustic insulation above suspended ceilings between all offices and other offices, conference room sand toilet rooms, unless wall finishes extend to structure above. Extend insulation 30" on each side of wall.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 9
SECTION 09510
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide acoustical ceilings and metal suspension system.

1. Acoustical panel ceilings, exposed suspension, complete with moldings and trim.
2. Concealed spline and similar acoustic ceiling systems are not acceptable.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Acoustical Panels:

1. Panel, 3/4" thick, medium fissured mineral tile.
    a. Panel sizes: 24" x 24".
    b. Panel edge: reveal edge; panel extends below grid.
    c. Align pattern in same direction.
    d. Provide washable tile where appropriate ie., kitchens, bathrooms, etc.
    e. Match Celotex, “Baroque” tiles or equal.

B. Exposed Grid Suspension System: Intermediate duty painted steel, white.

1. T-Grid.
2. Reveal Grid; DX Grid, US Gypsum.
3. Avoid use of suspended ceiling grids less than 15/16” wide, unless matching existing systems in place. All grids shall be white.

C. Exposed Grid Suspension System (for wet areas): Intermediate duty painted aluminum; T-grid,white.

1. Avoid use of suspended ceiling grids less than 15/16” wide, unless matching existing systems in place. All grids shall be white.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All materials shall be installed in accordance with the manufacturers’ recommendations and requirements.
B. Center grid in space in both directions so that not less than one half tile remains, unless otherwise indicted on the reflected ceiling plans.
C. No equipment or above ceiling items shall be allowed to be hung from ceiling and these items must be independently supported to building structure.

DIVISION 9
SECTION 09650
RESILIENT FLOOR

PART 1 - GENERAL

1.01 SUMMARY

A. Provide resilient flooring and base.

B. Avoid use of fissured, or ribbed or otherwise textured vinyl composition or rubber tile, unless slip resistance is important. Such tiles are very difficult to clean.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Tile Floor:

1. Vinyl composition tile, as manufactured by Armstrong, or equal. Match existing floor color, Armstrong #51904, " Sterling".

B. Sheet Floor:

1. Rubber sheet flooring.
2. Static dissipating tile as manufactured by Armstrong, or equal. Architect to select color from standard selection.

C. Accessories:

1. Wall base, 4" high, matte finish, rubber, Architect to select color from standard selection.
2. Corners, preformed.
3. Adhesive, waterproof.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All materials shall be installed in accordance with the manufacturers' recommendations and requirements.

END OF SECTION

DIVISION 9
SECTION 09685
CARPET TILE

PART 1 - GENERAL

1.01 SUMMARY

A. Provide carpeting:

1. Carpet tiles

B. Carpet accessories specified elsewhere include rubber base specified in section 09650.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials: Milliken, Collins and Aikman, Lee or Shaw Industries, releasable, cushion-back, multi-colored, textured, woven thru the back.

B. To establish the design intent and to set a level of quality, drawings and specifications are based on Milliken's sisal style, "Savannah" 36 x 36 cushion back tile, which has been installed in other areas of the building. Color for this project to match number 186, "Warm Springs."

C. Accessories: Rubber base.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All materials shall be installed in accordance with the manufacturers' recommendations and requirements.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 9
SECTION 09900
PAINTING

PART 1 - GENERAL

A. Provide painting and surface preparation for interior and exterior surfaces, including electrical and mechanical equipment.

PART 2 - PRODUCTS

A. First line standard products for all systems by Benjamin Moore, Olympic, Glidden, Devoe, Polomyx, Tnemec, Zolotone or approved equal.

B. Exterior Paint Systems:

1. Concrete and masonry: Acrylic latex, 2 coats.
2. Concrete masonry units: Block filler; acrylic latex, 2 coats.
3. Wood for opaque finish: Alkyd primer; alkyd enamel, 2 coats.
4. Wood for semi-transparent finish: Semi-transparent stain, 2 coats.
5. Ferrous metal: Zinc chromate primer; alkyd enamel, 2 coats.
6. Ferrous metal (high performance): Zinc rich primer, epoxy, 1 coat; epoxy enamel, 2 coats.
7. Galvanized metal: Galvanized metal primer; alkyd enamel, 2 coats.
8. Galvanized metal (high performance): Epoxy primer; catalyzed epoxy enamel, 2 coats.

C. Interior Paint Systems:

1. Concrete masonry units: Block filler, multi-color, spray-applied, base and top coat, alkyd or water based. Allow for 6 color level finish.
2. Drywall (high performance): Latex primer; acrylic latex (eggshell), 2 coats.
3. Wood for opaque finish: Alkyd enamel undercoated; alkyd enamel, 2 coats.
4. Wood for transparent finish: Oil stain; sanding sealer; alkyd varnish, 2 coats.
5. Ferrous metal: Alkyd metal primer; alkyd enamel, 2 coats.
6. Ferrous metal (high performance): Epoxy primer; two-component epoxy, 1 coat.

PART 3 - EXECUTION

A. All materials shall be delivered to the site in the original containers with the original labels attached. Storage and application of the materials shall be in accordance with the manufacturer's recommendations and requirements.

B. Architect to select colors from full range of standard and custom colors.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 10
SECTION 10100
VISUAL DISPLAY BOARDS

PART 1 – GENERAL

1.01 SUMMARY

A. Install agency supplied whiteboards. Provide surface preparation where required.
B. Provide and install whiteboard wall surface in locations indicated.

PART 2 – PRODUCTS

2.01 Whiteboard wall surfacing system to be Walltalkers, Erase Rite System as manufactured by Righter Corp. or equal

PART 3 – EXECUTION

3.01 INSTALLATION

A. All materials shall be installed in accordance with the manufacturers' recommendations and requirements.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 10
SECTION 10400
INTERIOR SIGNAGE

PART 1 – GENERAL

1.01 SUMMARY

A. Provide and install interior building signage, including all signage required by the building code and by the ADA.

1. Signage to include 1 sign per new and existing doors to be mounted in compliance with ADA mounting heights.

PART 2 – MATERIALS

2.01 SIGNAGE

A. Wall mounted interior signage as manufactured by ASI sign systems or equal.
1. Provide ADA ready , in-house updateable, panel room signage, to indicate room number and name, equal to ASI “Interior 20” System.

B. Provide for custom color selection. Do not use fused lettering as it can be easily removed. All plastic shall be self-extinguishing

END OF SECTION

DIVISION 10
SECTION 10426
SPECIALITY SIGNAGE

PART 1 – GENERAL

1.01 SUMMARY

A. Provide specialty building signage indicating building name.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Metal Letters and numbers: Metal Art, A.R.K. Ramos, or approved equal.

1. Metal and Finish:
    a. Aluminum duranodic finish
    b. Provide 8” high letters, for wall mounting to brick veneer. Allow for 20 letters.
2. Type:
    a. Cast aluminum

PART 3 – EXECUTION

3.01 INSTALLATION

A. All materials shall be installed in accordance with the manufacturers’ recommendations and requirements.

END OF SECTION

DIVISION 11
SECTION 11130
AUDIO VISUAL EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Provide recessed ceiling mounted projection screens in locations indicated.
B. Install agency supplied audio – visual equipment to include speakers, and ceiling mounted projectors.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Projection Screens:

1. All screens shall be minimum 10 feet wide, 8 feet in length, and motor operated with, wall switch.

2. Screens shall have matte white finish. Do not use glass-beaded screens.

3. Provide recessed units.

4. Include all miscellaneous cables, connectors and hardware required to mount equipment and interconnect with other audiovisual equipment.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

DIVISION 11
SECTION 11450
RESIDENTIAL APPLIANCES

PART 1 – GENERAL

1.01 SECTION REQUIREMENTS

A. Install all agency supplied appliances. Appliance descriptions are included for coordination purposes.
B. Coordinate all electric, mechanical and plumbing requirements.

PART 2 – PRODUCTS

2.01 RESIDENTIAL APPLIANCES

A. Electric Range: 30-inch wide, slide-in electric range with 4-burner cooktop and continuous cleaning oven with broiler; listed by UL.

B. Microwave Oven: Freestanding microwave oven, 1.5 cu. ft. capacity, 1000W; listed by UL.

C. Exhaust Hood: 30-inch, wall-mounted, ventilating exhaust hood with variable speed that exhausts to the outside, listed by UL.

D. Bottom Mount Refrigerator/Freezer: Freestanding, frost-free, two-door refrigerator with bottom mounted freezer, baked-enamel-on-steel interior cabinet liners; listed by UL.

1. Fresh Food Compartment Volume: 21 cubic feet
2. Provide automatic icemaker.

E. Dishwasher: Built-in, undercounter, automatic dishwasher, sized to replace 24-inch (610-mm)
a. base cabinet, 6 wash cycles with hot-air and heat-off drying cycles, stainless-steel tub and door liner, pvc coated sliding dish racks with removable silverware basket; listed by UL.

F. Disposer: Large capacity ½ HP continuous feed with 2600 RPM motor, stainless steel impellers and above counter switch; listed by UL.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Built-in Appliances: Securely anchor to supporting cabinetry or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

B. Agency - Supplied: Place in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

C. Coordinate with mechanical and electrical trades for installation of exhaust duct, icemaker, plumbing, electrical supply and above counter outlets, etc.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 12
SECTION 12510
WINDOW TREATMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. Provide window treatments, including:

1. Horizontal Blinds

PART 2 – PRODUCTS

2.01 MATERIALS

A. Components and Features:

1. Horizontal Blinds

a. Aluminum “mini” Blinds, as manufactured by Levolor or equal.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 15
SECTION 15010
GENERAL CONDITIONS FOR BUILDING MECHANICAL WORK

PART 1 - GENERAL

1.01 SUMMARY

A. This specification covers general conditions for mechanical systems and work.

1.02 INTENT

A. It is the intent of the Specifications to call for finished work, tested and ready for operation.

B. Where specific quantities or capacities of items are indicated, it is intended to indicate minimum requirements for general guidance only. Based on the building's final design, additional quantities or capacities may be required.

1.03 CODES AND STANDARDS

A. The Standards listed below apply to all mechanical work. Wherever Codes and/or Standards are mentioned in these Specifications, the latest edition or revision shall govern.

AABC	Associated Air Balance Council
ACGIH	American Conference of Governmental Industrial Hygienists
ADC	Air Diffusion Council
AGA	American Gas Association
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ARI	Air Conditioning and Refrigeration Institute
ASE	Association of Safety Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, including ASHRAE/IES
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CGA	Compressed Gas Association
CISPI	Cast Iron Soil Pipe Institute
EJMA	Expansion Joint Manufacturing Association
EPA	Environmental Protection Agency
HIS	Hydraulic Institute Standards
IBR	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
ISO	Insurance Services Office
MCAA	Mechanical Contractors Association of America
NBS	National Bureau of Standards
NEBB	National Environmental Balancing Bureau

NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NOFI	National Oil Fuel Institute
NSC	National Safety Council
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
PDI	Plumbing and Drainage Institute
SBI	Steel Boiler Industry (Division of Hydraulics Institute)
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
STI	Steel Tank Institute
UL	Underwriters' Laboratories

B. All materials and work shall comply with the requirements of the local utility companies, the recommendations of the fire insurance rating organization having jurisdiction and all the Governmental departments having jurisdiction.

1.04 COORDINATION WITH OTHER DIVISIONS

A. Work shall be carried out in conjunction and full cooperation with other sections and divisions in order that all work may proceed without delay and interference.

1.05 MANUFACTURER'S IDENTIFICATION

A. All component parts of each item of equipment or device shall bear the manufacturers' nameplate giving name of manufacturer, description, size, type, serial and model number, electrical characteristics, etc. in order to facilitate maintenance or replacement. The nameplate of a Subcontractor or distributor is not acceptable.

1.06 SHOP DRAWINGS

A. Provide shop drawings for all devices specified for all systems including HVAC, plumbing, sprinkler, etc.

1.07 RECORD DRAWINGS

A. Maintain at the job site a record set of Mechanical Drawings on which any changes in location of equipment, piping, ducts, valves etc., shall be recorded. These shall be clearly marked "Record Drawings - Job Set". All mark-ups shall be transferred to a clean set at the completion of the work and turned over to the Owner/Engineer.

1.08 MATERIALS AND WORKMANSHIP

A. All materials and equipment required for the work, except as otherwise specifically indicated, shall be new, of first class quality, and shall be furnished, installed and finished in every detail and shall fit properly into the building.

1.09 BASES AND SUPPORTS

A. Provide all necessary supports, rails, framing, bases and piers required for all equipment.

B. All equipment supports shall be designed and constructed such that the equipment will be capable of resisting both vertical and horizontal movement resulting from seismic forces.

1.10 TAGS AND CHARTS

A. Each valve and piece of apparatus under this Section shall be provided with suitable metal or plastic identification. Use metal tags for valves and laminated engraved plastic labels for apparatus.

1.11 COLOR CODING AND PIPING IDENTIFICATION

A. All piping, controls, tanks, tubing, etc., shall be color coded for quick identification in conformance with ANSI A13.1.

B. All exposed piping shall be marked with semi-rigid color-coded plastic identification markers, Seton Setmark Type "SNA", Type "STR" or equivalent. Concealed piping may be stenciled.

C. Label piping at each side of wall penetrations and at 20’ intervals.

D. All underground piping runs, both mechanical and plumbing shall be protected with buried pipeline marker. Marker to be 6-mil thick, 3” wide, fluorescent yellow polyethylene. Tape to be imprinted to read “Caution-buried pipe below”.

E. Tape to be placed 1’-0 directly above top of pipe, over entire length of run.

F. Tape to be placed on top of 4” deep x 6” wide layer of clean white sand.

G. Any existing tape, which is encountered, removed or disturbed during excavation, shall be replaced in conformance with items above and to the approval of the Construction Administrator prior to backfilling.

1.12 PIPE EXPANSION

A. All piping shall be installed to allow for freedom of movement during expansion and contraction without springing. Swing joints, expansion joints, or expansion loops with anchors and guides shall be provided where necessary.

1.13 MAINTENANCE

A. Provide the necessary skilled labor to assure the proper operation and provide all required current and preventative maintenance for all equipment and controls until final acceptance of the building.

1.14 CLEANING

A. Thoroughly clean and flush all piping, ducts and equipment of all foreign substances, oils, burrs, solder, flux, etc., inside and out before placing them in operation.

B. Before final acceptance by the State, change all air filters.

C. After pipe flushing, clean all strainer baskets.

D. Before final acceptance by the State, clean all plumbing fixtures and trim.

1.14 OPERATING INSTRUCTIONS

A. Instruct the Owner in the operation, adjustment and maintenance of all equipment furnished. Coordinate training schedule with the Owner.

B. Furnish to the Owner 10 complete bound sets of typewritten or blueprinted instructions for operating and maintaining all systems and equipment.

1.15 ADJUSTING AND TESTING

A. After all the equipment and accessories to be furnished are in place; they shall be put in final adjustment and subjected to such operating tests so as to assure that they are in proper adjustment and in satisfactory, permanent operating condition.

B. Start-up of boilers, chillers pumps, air handlers, condensing units, and all other major equipment shall be performed by factory-authorized personnel.

1.16 GUARANTEES

A. During the guarantee period, all defects developing through faulty equipment, materials or workmanship shall be corrected immediately by the Contractor without expense to the Owner, when so directed by the Owner, and such repairs or replacements shall be made to his satisfaction.

END OF SECTION

DIVISION 15
SECTION 15050
BASIC MATERIALS AND METHODS FOR BUILDING MECHANICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. The intent of this Section is to establish a standard of quality and performance for materials and installation methods used in building mechanical systems. It is not the intent of this Section to define particular or exact materials or products to be used.

B. Return air ceiling plenums are not acceptable as part of a smoke evacuation system.

C. System shall be designed to meet all applicable energy saving design standards, including utility company rebate programs.

D. Provide and install UL approved fire and / or smoke seals for ductwork, piping etc., passing through fire and / or smoke rated construction.

1.02 GENERAL REQUIREMENTS

A. All materials and equipment required for the work shall be new, of first class quality, and shall be furnished, delivered, erected, connected and finished in every detail.

B. All material shall be of a type, which is currently manufactured as standard, accepted product and commonly available through normal suppliers.

C. All material and equipment shall be installed by experienced, skilled tradesmen under the supervision of a licensed journeyman foreman. All work shall be installed using commonly accepted methods and shall be of a quality consistent with good trade practice.

D. Provide and install UL approved fire and / or smoke seals for ductwork, piping etc., passing Through fire and /or smoke rated construction.

PART 2 - PRODUCTS

2.01 PIPING

A. Black steel and galvanized steel pipe 2" and smaller shall be Schedule 40 ASTM A-53, A-106, or A-120, Grade A, thread and coupling type. Pipe sizes 2 1/2" and larger shall be ASTM A-53, A-106, or A-120, plain end type for welding. Schedule 80 for steam condensate, if any.

B. Copper tubing shall be seamless and shall conform to ASTM B-306, ASTM B-280 and/or ASTM B-88. Tubing shall be Type K, L, or ACR hard drawn or soft annealed, as specified.

C. Cast iron pipe shall be service weight ASTM A-74 with hub and spigot or no-hub joints. Each length of pipe shall bear the insignia of the Cast Iron Soil Pipe Institute (CISPI).

D. Ductile iron pipe shall conform to ANSI A21.51 and AWWA C-151.

E. Fiberglass reinforced, polyester resin pipes shall conform to ASTM D-2996 and/or ASTM D-2997 for bell and spigot or threaded end pipe and fittings. Do not use plastic pipe materials above ground.

2.02 PIPING HANGERS AND SUPPORTS

A. All hanger, support and anchor types or model numbers specified herein are based on Fee & Mason or equivalent by Grinnell. Supports shall conform to ANSI B31.1.

B. Hangers for pipe sizes 2" and smaller shall be light duty, clevis type, #105. For installations where the hanger is in direct contact with copper pipes 2" and smaller, use #367 copper plated hangers or plastic coated hangers.

C. Hangers for pipes over 2-1/2" shall be clevis type, #239. For installations where the hanger is in direct contact with copper sizes 2-1/2" through 4", use #364. Use saddles or insulation protectors.

D. For insulated cold and chilled water piping, hangers shall be sized for the specified Insulation thickness. Provide non-compressible insulation inserts of the required thickness and a sheet metal hanger saddle to prevent crushing of insulation by the hanger.

E. For fire protection systems, all hangers and supports shall be UL listed and FM approved.

2.03 GAUGES AND INSTRUMENTS

A. Pressure gauges and compound gauges shall be Bourdon tube type as manufactured by Marsh, Taylor or Trerice.

2.04 VALVES

A. Wherever possible, all valves shall be of the same manufacturer.

B. Valves shall be line size, except for automatic control valves.

C. Valve types and models as listed below shall apply to all piping systems with maximum working pressures less than 150 PSIG.

D. Valves for use in HVAC systems shall be as scheduled below:

	2" and smaller	2-1/2" and larger
1. Gate Valves:	125 lb. WSP rising stem union bonnet, solid wedge. Threaded bronze body.	125 lb. WSP OS&Y rising stem renew-able seat rings, solid wedge. Iron body. Flanged, brass or bronze fitted, suitable for packing under pressure.

2. Globe Valves:	150 lb. WSP renewable composition disc, screwed or union bonnet, threaded bronze body.	125 lb. WSP OS&Y rising stem renewable disc. Iron body. Flanged, brass or bronze fitted, suitable for packing under pressure.

3. Check Valves: for base-mounted pump discharge application:	Silent type check valve, wafer style with spring loaded butterfly or globe type with center guided lift disc. Valves shall have stainless steel trim. 250 lb. WSP.	
	2" and Smaller	2-1/2" and Larger
4. Check Valves other, disc pipeline applications:	Swing check with renewable composition bronze trim and body. Screwed. 300 lb. WOG flanged.	200 lb. CWP, swing check with renewable composition disc, bronze trim. Iron body.

5. Ball Valves - 1/2" - 2-1/2": Bronze, one-piece body with threaded ends, chrome plated or stainless steel ball, blowout proof stem seal, reinforced Teflon seats. 150 lb. WSP, 400 lb. WOG.

6. Butterfly reinforced Valves - 2-1/2" and Up: ANSI Class 150 rated lug body valve with stainless steel stem and disc seats.

7. Balancing Valves 100% shutoff type: "Y" globe valve with D.P. 2-1/2" thru 12" gauge ports, memory stop handle. Threaded ends.

G. Valves for plumbing systems shall be as scheduled below:

	2-1/2" and Smaller	3" and Larger
1. Gate Valves:	200 lb. WOG, Class 125 bronze, solder end, non-rising stem.	Class 125, flanged end, bronze, mounted, iron body, non-rising stem. 200 lb. WOG.

2. Ball Valves: 2" and Smaller
600 lb. CWP, bronze, 2 piece threaded end, bronze or steel ball, Teflon or TFE seat rings and blowout-proof stem.

3. Butterfly Valves: 2-1/2" and Larger
200 lb., iron body, ductile iron disk, Buna-N seat, O-ring stem seals, stainless steel stem, plugged body.

4. Check Valves:	2" and Smaller Class 125, threaded end, bronze swing check with regrinding bronze disc.	2-1/2" and Larger 200 lb., WOG, flanged end, cast iron swing check with bronze disc.
5. Globe Valves:	2" and Smaller 300 lb., CWP, threaded end, all bronze, rubber disc. Milwaukee #590T Jenkins #106-A Nibco #T-235 Stockham #B-22	
6. Gas Valves:	2" and Smaller 125 lb., iron body, bronze plug, square head, threaded end.	2-1/2" and Larger 125 lb., WDG, semi-steel, Buna-N coated plug, flanged end.
7. Balancing Valves:	100% shutoff, threaded ends, memory stop and D.P. gauge ports.	

2.11 DUCTWORK

A. All ductwork and accessories shall be constructed, fabricated and installed in accordance with the latest SMACNA Standards.

B. Duct materials shall conform to the following specifications and/or alloy numbers: Galvanized steel duct: ASTM A-527, galvanized sheet steel, lock forming quality with G-90 coating.

C. Accessory materials such as tapes, sealants, and fasteners, shall comply with NFPA 90A and shall be SMACNA and UL approved.

D. Proper duct sealants shall be used to seal joints in ductwork. Duct tape shall not be used as a method of sealing ducts.

E. Fire dampers shall be installed in conformance with their UL listing.

2.12 DUCTWORK ACCESSORIES

A. On all air handling equipment including in-line, rooftop, and utility and cabinet fans, furnish and install flexible duct connectors to isolate fan vibration from the duct system. For general-purpose duct systems, use a fiberglass or nylon reinforced, neoprene type material with metal edge connectors.

B. Volume dampers with locking quadrants shall be installed in all ducts where required for proper balancing.

1. In branch and main ducts, use multiple, opposed blade dampers constructed of galvanized steel with reinforced blades and locking quadrants.

2. For air terminal runouts use rectangular or round butterfly dampers with rigidly locked shaft and locking quadrants.

C. Fire dampers shall be installed at all rated walls or shafts and at all floor penetrations and where required by code.

D. Access for mechanical devices installation and future maintenance is essential. Provide access doors where required and at all fire and balancing dampers for inspection and resetting.

E. Double width airfoil type turning vanes shall be furnished and installed in all mitered elbows 45 degrees or greater.

F. Roof curbs shall be furnished and installed for all equipment, which involves roof penetrations of ducts or piping bundles. Curbs shall extend at least 12" above the finished roof surface by equipment manufacturer.

G. Louvers shall be constructed of extruded aluminum with anodized finish, and shall conform to ASTM B-21. Louver assemblies shall be complete with frames, galvanized or aluminum bird screens, rainproof horizontal slats, sills, jambs, mullions and any other braces or stiffeners as required to form a rigid assembly.

2.13 VIBRATION CONTROL

A. All mechanical equipment, except slab on grade-mounted equipment, shall be mounted on or suspended from vibration control equipment. Where required, piping and ductwork shall be installed with vibration isolating hangers or supports.

B. All vibration isolators used for mounting equipment and/or piping or ductwork shall incorporate seismic snubbers to resist horizontal movement in any direction and vertical limit stops to restrict vertical movement of equipment. In lieu of this, separate seismic snubbers may be installed adjacent to vibration isolators.

2.14 INSULATION

A. All insulation shall conform to Connecticut State Model Energy Code.

B. Thermal and/or acoustical insulation shall be applied to mechanical piping, ductwork and equipment as specified.

C. All insulation materials, including jackets and adhesives, shall meet the requirements of NFPA 90A, according to ASTM Test E-84, NFPA 255 and UL 723, having a flame spread rating of not over 25, a smoke developed rating of not over 50 and a fuel contributed rating of not over 50.

D Insulation shall conform to ASHRAE/IES 90.1.

E. Submit for review, a schedule of insulating materials listing the type, method of installation, thickness, jacket and equipment to which each type of insulation will be applied. Staples are not acceptable for insulation installation. All “raw” ends of insulation shall be sealed.

F. Insulation for pipe 1/2" through 12" Pipe Size: 3.9 PCF density, one piece, rigid fiberglass with vapor barrier, all service jacket and self-sealing lap joint and butt strips, insulation saddles, rigid insulation inserts under saddles for piping 2" and over.

H. High temperature hot water insulation below grade shall consist of a “Kaylo” type hard insulation (concrete and perlite mix with a “K” factor of .58), calcium silicate, or Foamglass. Either choice should be covered with visqueen.

I. Duct Insulations:

1. Faced duct wrap shall be 1.0 PCF density, fiberglass wool blanket with a reinforced, foil-kraft vapor barrier facing.
2. Rigid board insulation shall be 6.0 PCF density, fiberglass material with a reinforced, foil-kraft vapor barrier facing.
3. Acoustical duct liner shall be a bonded, mat fiberglass material with a fire resistant airstream side coating. Material shall be 2.0 PCF density.

2.15 MOTORS

A. All electric motors furnished as a component part of equipment furnished shall conform to the requirements of NEMA Standard MG-l, UL, and ANSI.

B. Motors smaller than 1/2 HP shall be capacitor start or split phase designed for 115 Volts, single phase, 60-cycle alternating current. Motors 1/2 HP and larger shall be squirrel cage induction or wound rotor induction designed for 3-phase, 60-cycle, 208 or 480 Volt alternating current. Motors smaller than 1/2 HP to be provided with built-in thermal overload protection. Motors 1/2 HP and larger shall have overload protection built into the motor starters.

C. All motor efficiencies shall meet or exceed ASHRAE 90.1.

PART 3 - EXECUTION

3.01 PIPING INSTALLATIONS

A. Piping shall be installed in a neat, workmanlike manner and shall be properly supported, meeting all applicable codes and standards including seismic requirements.

3.02 HANGERS, ANCHORS, GUIDES OR SUPPORTS

A. Piping shall be hung from the building structure including beams, joists, upper floor deck or walls. Piping shall not be hung from equipment of other trades.

3.05 VALVES

A. Valves shall be installed in piping systems at each piece of equipment and at each major branch piping take-off.

B. Valves to be installed with stems facing up or horizontal.

3.06 DUCTWORK

A. General:

1. Air turning vanes shall be installed at all 45 degrees or greater mitered elbows in ducts.

2. Provide 6” long, neoprene or canvas type flexible connectors where ducts connect to fans and air handling units.

3. Provide volume dampers with locking quadrants or splitters with hinge and rod through side of duct with setscrew at all branch takeoffs.

4. Galvanized sheet metal plenums, casings, blank off sheets and similar applications to be constructed in accordance with SMACNA Standards.

5. All branch duct takeoffs shall be made with a 45 degree entry fitting, bellmouths, or parallel flow branch fittings as detailed in SMACNA "Duct Construction Standards". The use of 90-degree straight tap fittings shall not be permitted.

B. All ductwork shall be constructed of galvanized steel, fabricated and installed in accordance with the latest editions of SMACNA Standards.

C. Flexible duct shall be installed in accordance with the manufacturer’s recommendations and the SMACNA "Flexible Duct Installations Standards". The maximum length of flexible duct shall be 4'-0".

3.07 INSULATION

A. Insulation shall be applied to mechanical equipment, piping, ductwork, etc., in thickness and of material as specified elsewhere.

B All insulation work shall be installed by competent applicators regularly employed by Insulation Subcontractors or manufacturers. All insulations shall be applied in strict accordance with the manufacturer's recommendations.

C. All insulation shall be applied continuously through walls, floors, sleeves, plenums and other openings, except at fire rated floors and walls.

D. Provide insulation inserts and insulation protection shields at hanger and bearing locations (piping 1" to 4" size), and insulated pipe saddles for insulated piping 3-1/2" size and larger. Provide a UL listed firestop detail where piping passes through rated floors and walls. Provide fittings and pipe accessory insulation and covers. Provide continuous vapor barrier and sealant for all cold piping.

E. Enclose fittings and valves with fiberglass insulation and premolded fitting covers. Provide vapor barrier on cold piping.

3.08 PIPING IDENTIFICATION

A. Provide pipe identification markers on all piping systems to identify contents and flow direction as follows:

1. Exposed risers: Every floor level.
2. Exposed horizontal Runs: Maximum 20’ on center and on both sides of wall penetrations.

3. Mechanical Rooms: As required; maximum 15' on center.
4. Accessible concealed piping may be identified with stenciling.

B. Identify each valve in each piping system with a numbered and lettered brass tag to identify the system and the individual valve.

C. Provide typed valve charts for each piping system wall mounted in a location approved by the Owner. Include copies of the valve charts in the operation and maintenance manuals.

END OF SECTION

DIVISION 15
SECTION 15400
PLUMBING SYSTEMS

PART 1 - GENERAL

1.01 TECHNICAL REQUIREMENTS

A. Provide all items and work in accordance with local, state and federal codes and standards.

B. Provide all fees, licenses, etc. Perform start up and testing on each item and system to provide fully operable systems.

1.02 WORK INCLUDED

A. Sanitary drainage and vent piping systems

B. Domestic cold, hot, and recirculating hot water piping systems and specialties

C. Domestic water heating equipment

D. Fuel gas piping systems and specialties

E. Piping systems insulation

F. Plumbing fixtures, equipment connections

G. Identification of piping, valves and equipment

H. Tests

I. Disinfection of potable water systems

J. Maintenance manuals

K. Fuel oil piping system including tanks, day tanks, pumps

1.03 CODES AND STANDARDS

A. The State of Connecticut Building Code

B. The State of Connecticut Plumbing Code

C. The State of Connecticut Mechanical Code

D. The National Fuel Gas Code NFPA 54

E. City, State, and Federal regulations for the installation of non-residential underground petroleum storage tanks.

1.04 REFERENCE PUBLICATIONS

A. American Society for Testing and Materials (ASTM) and American National Standards Institute (ANSI) publications are referred to herein. Because these publications are revised frequently, the latest edition shall govern.

1.05 FIRESTOPPING

A. Provide and install UL approved fire and/or smoke seals for piping passing through fire and/or smoke rated construction.

1.06 SEISMIC CONTROL

A. Install equipment to resist lateral forces, including overturning moments, produced by earthquake loading as defined in the Connecticut Building Code.

1.09 ELECTRICAL CONNECTIONS

A. Equip electrical items with NEMA approved enclosures having adequate knockouts, connectors, terminal blocks and/or contacts. Power wiring to plumbing equipment will be provided and installed under Division 16. The plumbing Contractor will be responsible for all miscellaneous wiring within the system and/or component for complete and proper operation.

1.10 MAINTENANCE MANUAL

A. Include following in manuals:

1. Manufacturer's descriptive data
2. Installation, operation, and maintenance instructions
3. Replacement parts lists
4. Wiring diagrams
5. Manufacturer's Warranty & Service Certificates
6. Instructions for periodic cleaning and maintenance
7. Procedures for systems start-up and shut-down
8. Valve location and tag number charts

PART 2 - PRODUCTS

2.01 GENERAL

A. Refer to Section 15010 and 15050 for general conditions and basic materials.

2.02 DOMESTIC HOT, RECIRCULATING, AND COLD WATER

A. Piping: copper, type L, hard temper; ASTM B88.

B. Fittings: wrought copper, solder end; ANSI B16.22.

C. Solder: make up joints with 95-5 tin-antimony wire solder and non-corrosive flux. Do not use 50-50 or other lead containing solders.

D. Vacuum Breaker: atmospheric type, chrome plated bronze body, non-corrosive trim, threaded inlet and outlet; suitable for 125 psi, 210 degrees F., water.

E. Reduced Pressure Backflow Preventer: automatically operating assembly of pressure differential relief valve, located between two positive seating check valves, equipped with inlet strainer, inlet and outlet gate valves, test cocks; all bronze construction, with non-corrosive internal parts, 150 psi WWP; Watts 909 series.

F. Gas water heater: UL listed, AGA labeled, 10-year warrantee, ASHRAE - 90.1, 1989, complying, fully automatic, factory insulated to R-14 or better and jacketed, magnesium anode protected ASM glass-lined storage tank, with drain valve, draft diverter, self-generating control system, adjustable thermostat, high limit shut-off, 100% pilot safety shut-off, gas pressure regulator, equipped for natural gas. ASME T&P relief valve. AFUE rating of 85%, Energy factor at .96.

G. Electric water heater: UL listed, 10 year warranteed, ASHRAE 90.1 complying, factory insulated to R-14 or better and jacketed, magnesium and protected, ASME glass lined storage tank with drain valve and P&T relief valve.

H. Circulator pump: all bronze in line centrifugal pump, close coupled motor.

I. Motor starters: manual starting switch in NEMA I enclosure with "Hand-OFF-Auto" selector switch.

J. Controls must interface with the installation’s Building Automation System.

K. All water heaters shall comply with ASME Boiler and Pressure Vessel Code and shall be stamped with appropriate code symbols.

L. Other heating media shall be as approved by the Owner.

2.03 SANITARY AND ROOF DRAINAGE

A. Pipe and fittings below grade: standard weight cast iron soil, hub and spigot; ASTM A74, with one-piece neoprene gaskets matching the internal configuration of the hub, CISPI 301.

B. Pipe and fittings above grade: standard weight cast iron bell and spigot, or no hub for sizes 2" and larger; ASTM A53 galvanized schedule 40 steel with threaded malleable galvanized fittings for sizes less than 2".

C. Drain and cleanout construction: coated cast iron body, rust resistant hardware, appropriate grate, strainer or cleanout top.

2.04 VALVE MATERIALS

A. Bodies - bronze: ASTM B62.

B. Bodies - iron: ASTM A126 - Class B.

C. Stems - silicon brass; ASTM B198 Alloy 13B or ASTM B371 Alloy A.

D. Discs - manufacturer's standard for service involved.

2.05 PLUMBING FIXTURES

A. General:

1. All plumbing fixtures shall have water saving type controls.

2. Fixtures: first quality, new, complete with trimmings and fittings, including faucets, supplies, stops, traps, tailpieces, waste plugs, casings, hangers, plates, brackets, anchors, supports, hardware and fastening devices. All plumbing fixtures must be tight fitting to walls and be neatly sealed at joint with silicone sealant.

3. Stainless steel: type 302, 304, 316, or 317, sound deadened.

4. Trimmings and fittings: constructed of forged, cast, rolled or extruded brass or bronze with monel and other suitable non-corrosive parts: designed with parts subject to wear or deterioration easily renewable. No die castings and stablings other than brass or stainless steel.

a. Exposed surfaces: chrome plated
b. Pipe: 85% red brass
c. Pipe fittings: threaded bronze
d. Supply stops: bronze, stuffing box, renewable seat washer
e. Waste tailpiece: minimum #17 gage brass
f. Escutcheons: one piece cast brass or stainless steel
g. Lead bends: minimum 0.125 inch wall thickness

B. Sink: 18-gage type 302, self-rim double bowl, stainless steel sink with 2-hole rear deck, strainer with 1-1/2" tailpiece. One-piece chrome plated cast brass P-trap with cleanout plug, faucet with 11-inch spout, single lever control and spray. Loose key angle supply stops. Coordinate installation with dishwasher and disposer units referenced in Section 11450, Residential Appliances.

2.06 INSULATION

A. Cold-water piping and condensate piping: 1/2" fiberglass with ASJ and zeston type fittings.

B. Hot water and hot water recirculating piping: 1" on up to 2" piping, 1-1/2" on piping 2-1/2" and up.

PART 3 EXECUTION

3.01 SANITARY DRAINAGE, WASTE AND VENT SYSTEMS

A. Furnish and install a complete sanitary drainage system including all soil, waste, and house drains, vents, cleanouts, access doors, piping, pipe fittings, hangers, testing, and accessories as required.

B. This system shall generally consist of plumbing fixtures, floor drains, piped and drained by gravity to the municipal sanitary sewer and vented atmosphere.

C. Piping shall generally run concealed in all areas.

D. Provide each fixture and drain, not so equipped, with water sealed trap located close to fixture or drain outlet. Do not use swivel traps except in concealed limited space locations. Do not use plastic fixture traps.

E. Provide accessible cleanouts at base of stacks, at junction of building drain with building sewer (except located within building), at ends of horizontal runs, and at each change of direction greater than 45 degrees.

F. Install cleanouts not more than 50 feet apart in lines 4" diameter and smaller and not more than 100 feet apart in lines larger than 4"diameter. Minimum cover under roads for Sanitary Sewer Systems shall be 3'- 6" and minimum slope shall be 1' in 15' – 0" (.55% slope).

G. Position cleanouts in line with direction of flow. Allow at least 18 – inch clearance to permit access.

H. Extend cleanouts or concealed piping to finish flush with finished floor or wall unless other access is provided. Terminate floor and wall cleanouts with cleanout plate.

3.02 DOMESTIC HOT AND COLD WATER

A. Extend the existing system a complete and operational domestic hot and cold water system to plumbing fixtures and food service equipment, piping, valves, fittings, water heating equipment, cross connection protection devices, disinfection of system, and testing.

B. Provide complete and effective disinfection of potable water piping systems after testing and acceptance.

C. Protect potable cold and hot water supplies against backflow, back-siphonage, cross connection, and other unsanitary conditions.

D. Provide reduced pressure backflow preventers on water supplies to water-cooled equipment, food service equipment, building heating and cooling equipment, and other water connected items subject to backpressure or cross contamination.

E. Do not directly connect potable water to, or run within, any piping or device containing or conveying sewage, wastes, or other materials hazardous to health and safety.

F. Equip plumbing fixture supplies, other than "over-rim" type, with approved backflow preventers, vacuum breakers or air gap fittings. Supplies equipped for hose connection must have integral vacuum breakers.

G. Install drains and/or drain pans for equipment, which may discharge water from pressure relief valves, overflows.

3.04 PLUMBING FIXTURES

A. Where fixtures or trim are damaged or broken during construction they shall be replaced with new fixtures or trim of the same type.

B. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixture, to demonstrate capability and compliance with requirements. Correct malfunctioning units, then retest.

C. Inspect each installed unit for damage to finish. Remove damaged fixtures and replace with new units.

D. Clean plumbing fixtures, trim, and strainers of dirt and debris upon completion of installation.

E. Locate waste outlets and water supplies at uniform locations, with waste outlet centered on fixture drain connection and water supplies spaced equally to right and left.

F. Provide escutcheons on piping and fixture supports protruding from wall or floor, and on visible connections to fixtures.

3.06 SPECIAL DESIGN REQUIREMENTS

A. Provide and install miscellaneous equipment connections including condensate drains to HVAC.

END OF SECTION

DIVISION 15
SECTION 15600
HVAC SYSTEMS

PART 1 - GENERAL

1.01 TECHNICAL REQUIREMENTS

A. Provide all items and work to provide a complete system, ready for operation, to meet or exceed the program requirements. Perform start up and check out on each items and system to provide fully operable systems.

B. Do not use fan rooms as RA/FA plenums.

C. Hot and CHW coils to be redundantly protected from freezing. Face and bypass for water coils.

D. Hot and CHW coils to have 2 port valves. Pumps to be staged or provided with VSD's for capacity control.

E. Air side economizers are preferred over waterside economizers for IAQ reasons.

F. AHU’s shall have 30% prefilters, 65% intermediate filters, and clogged filter alarms.

G. VAV boxes and other equipment requiring access shall not be located in or above public spaces.

H. Do not use ceiling plenums as part of a smoke evacuation system.

I. Heating water temperature reset to be accomplished through boiler water mixing valve. Boilers to be operated at 140 degree to 160 degree higher as needed.

1.02 WORK INCLUDED, but not limited to, the following:

A. Chilled and hot water piping system and supports
B. Chilled and hot water circulating pumps
C. Expansion compensators, guides, anchors
D. Refrigerant piping and accessories
E. Condensing units
F. Valves, gauges, thermometers
G. Sheet metal duct systems and supports
H. Volume dampers, extractors, turning vanes, etc.
I. Grilles, registers, diffusers
J. Exhaust fans
K. Piping and duct insulation
L. Motor Starters
M. Vibrating isolators
N. Piping, valve and equipment identification
O. Tests and cleaning
P. Air and water system balancing
Q. Maintenance manuals
R. Owner’s instruction
S. Vehicle bay exhaust system
T. All other mechanical equipment and supports

1.03 CODES AND STANDARDS

A. The State of Connecticut Building Code

B. Latest applicable edition of all other local codes and regulations.

1.04 REFERENCE PUBLICATIONS

A. American Society for Testing and Materials (ASTM) and American National Standards Institute (ANSI) publications are referred to herein. Because these publications are revised frequently, the latest edition shall govern.

1.05 FIRE STOPPING

A. Provide and install approved fire and/or smoke seals for piping and ductwork passing through fire and/or smoke rated walls.

1.06 SEISMIC CONTROL

A. Install mechanical equipment to resist lateral forces, including overturning moments, produced by an earthquake loading as defined by the Connecticut Building Code.

1.07 PERMITS AND FEES

A. Secure and pay costs of permits, certificates, licenses, inspections and approvals.

1.08 APPROVALS

A. Obtain Certificates of Approval from Building Official.

1.09 ELECTRICAL CONNECTIONS

A. Equip electrical items with NEMA enclosures. Power wiring to HVAC equipment will be provided and installed under Division 16. The HVAC Contractor will be responsible for all miscellaneous wiring within the system and/or component for complete and proper operation. The HVAC Contractor will be responsible for providing starters for all equipment he furnishes.

1.10 MAINTENANCE MANUAL

A. Include the following in manuals:

1. Manufacturer's descriptive data
2. Installation, operation and maintenance instructions
3. Replacement parts lists
4. Wiring diagrams
5. Manufacturer's Warranty & Service Certificates
6. Instructions for periodic cleaning and maintenance
7. Procedures for systems start-up and shut-down

8. Valve location and tag number charts

1.11 GUARANTEE

A. Supply two copies of a warranty stating that imperfect system operation and all defects in labor and materials of HVAC, plumbing, and sprinkler work will be repaired without cost to Owner for a period of one year from date of substantial completion, except that the automatic temperature control system and energy management system shall be warranteed for a period of two years, and except that all refrigeration compressors shall be warranteed for a period of five years, and stating that all HVAC equipment has been fully serviced and left in proper operating condition.

PART 2 - DESIGN CRITERIA

2.01 GENERAL

A. Design criteria are to be used for sizing of equipment and distribution using good engineering practice.

B. Size HVAC equipment to allow for outdoor air quantities of up to 20 CFM per person.

2.02 INDOOR CONDITIONS

A. Indoor design conditions shall conform to the Connecticut State Building Code.

2.03 OUTDOOR CONDITIONS

A. Outdoor design conditions shall conform to the Connecticut State Building Code.

2.04 VENTILATION REQUIREMENTS

A. Minimum total ventilation requirements shall be as specified in the State of Connecticut Building Code and the State of Connecticut Mechanical Code.

2.05 DUCTWORK PARAMETERS

A. Return ducts, exhaust ducts, constant volume supply ducts and supply ducts on the downstream side of VAV boxes shall be sized for a pressure drop of 0.08" WG per 100 feet, 1300 FPM maximum velocity.

B. Supply ducts upstream of VAV boxes shall be sized for a pressure drop of 0.2" WG per 100 feet up to 7000 CFM, and sized for 2000 FPM maximum velocity over 7000 CFM.

2.06 AIR TERMINAL PARAMETERS

A. Supply, return and exhaust terminals shall be sized for a maximum of NC=25 in private offices and conference rooms and NC=30 elsewhere.

2.07 SAFETY FACTORS

A. Major equipment shall be sized to provide a 15% safety factor.

PART 3 - PRODUCTS

3.01 GENERAL

A. Refer to Sections 15010 and 15050 for General Conditions and Basic Materials and Methods.

3.02 PIPING

A. Hydronic heating and chilled water piping: Schedule 40 black steel with welded or flanged fittings on piping 2-1/2" or larger; Schedule 40 black steel with threaded fittings or Type L copper with 95/5 soldered wrought fittings on piping 2" or smaller.

B. Refrigerant Piping: Hard drawn ACR copper tubing with forged or wrought copper silver soldered fittings.

3.03 DUCTWORK

A. All ductwork shall be galvanized sheet steel, constructed, assembled sealed and supported per SMACNA Guidelines.

3.04 VEHICLE BAY EXHAUST SYSTEM

A. Provide and install “Plymovent” vehicle exhaust system or equal, ceiling mounted duct system to support exhaust of all vehicles in the Apparatus Bays. Provide manufacturer’s engineering data and stamped shop drawings to safely exhaust vehicle emissions for length of bays.

1. Provide three exhaust units in each overhead door bay as indicated.
2. Exhaust system to include spring operated retractable coiling hoses with adjustable safety disconnect couplings. Provide and install all blowers and ductwork as required for a complete system.

3.05 INSULATION

A. Ductwork:

1. Concealed ductwork: 2" thick fiberglass with vapor barrier.
2. Exposed ductwork and ductwork in mechanical rooms and plenums: 1-1/2" thick rigid fiberglass board with vapor barrier.

B. Piping:

1. Heating hot water: 1" on piping up to 2", 1-1/2" on piping from 2-1/2” to 4", 2" on piping over 4"; all insulation fiberglass with ASJ and zeston fittings.
2. Chilled water: 1" on piping up to 2", 1-1/2" on piping over 2"; all insulation fiberglass with ASJ and zeston fittings.
3. Refrigerant piping: 1” thick fiberglass with ASJ and zeston fittings. 1" thick expanded

rubber type may be used in areas other than return air plenums. Provide ultraviolet protective jacket where exposed to sunlight.

4. Emergency generator exhaust: Two 2" layers of calcium silicate insulation, factory nested, staggered joints, banded in place, stainless steel or aluminum jacket.

C. Chilled Water Pumps:

1. Chilled water pump casings: 1” expanded rubber to form effective vapor barrier.

PART 4 - SYSTEM DESCRIPTION

4.01 HEATING AND COOLOING

A. Office Area: Provide ceiling mounted evaporator system with electric heat pump option where indicated. Support units to structure above and recess to provide flush installation.

B. Individual room air conditioners are not acceptable.

4.02 EXHAUST

A. Provide exhaust for all toilet rooms, janitor's closets, kitchen, copy rooms, lounges, etc.
1. Pipe all condensate to building exterior.
2. All piping to be concealed above ceiling.
3. Provide individual wall mounted thermostat in each area served.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 16
SECTION 16010
GENERAL CONDITIONS FOR BUILDING ELECTRICAL WORK

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers general conditions for electrical systems and work.

1.02 INTENT

A. The intent of the specifications is to call for finished work, tested and ready for operation.

1.03 CODES AND STANDARDS

A. The Codes and Standards listed below apply to all electrical work.

State of Connecticut Building Code and Fire Safety Code
IES Lighting Handbook
NEMA Standards
ANSI C1 National Electrical Code (NFPA 70)
ANSI C50 Rotating Electrical Machinery
ANSI C51.1 Construction and Guide for Selection, Installation and Use of Electric Motors
ANSI C52.1 Motors and Generators (NEMA MG1) FIPS Publication 94-1983
NFPA Standards

B. The following abbreviations are used within this division of the specifications:

IES Illuminating Engineering Society
NEC National Electrical Code
ANSI American National Standards Institute
ASTM American Society for Testing and Materials
EPA Environmental Protection Agency
IEEE Institute of Electrical and Electronic Engineers
NEMA National Electrical Manufacturers Association
NFPA National Fire Protection Association
OSHA Occupational Safety and Health Administration
UL Underwriter's Laboratories

C. All materials and work shall comply with the requirements of the local utility companies, and the recommendations of the fire insurance rating organization.

1.04 PERMITS AND FEES

A. Provide all necessary notices, obtain all permits, pay all sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with the work.

1.05 COORDINATION WITH OTHER DIVISIONS

A. Work shall be carried out in conjunction and cooperation with other trades in order that all work may proceed with a minimum of delay and interference.

B. Coordinate location and installation of all electrical work with other trades.

1.06 MANUFACTURER'S IDENTIFICATION

A. Manufacturer's nameplate, name or trademark and address shall be attached permanently to all equipment furnished. The nameplate of a contractor or distributor shall not be acceptable.

B. All material and equipment shall be UL listed.

1.07 SHOP DRAWINGS

A. Submit for review detailed shop drawings of all equipment and material to be used to clearly demonstrate conformance with the specifications.

1.08 RECORD DRAWINGS

A. Maintain a record set of electrical drawings at the job site on which any changes in location of equipment, panels and major conduits shall be recorded. These shall be clearly marked on a clean set of reproducible sepias at the completion of work for record drawings and turned over to the engineer.

1.09 MATERIALS AND WORKMANSHIP

A. All materials shall be new and of first class quality and shall be furnished, delivered, installed and finished in every detail and so selected and arranged as to fit properly.

B. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, workmanlike manner.

1.10 BASES AND SUPPORTS

A. Provide concrete pads for switchboards, generators, motor control centers and other freestanding equipment. All pads shall be extended 4” high and 6" beyond machine base in all directions, be anchored to the floor structure, and have top edge chamfered.

1.11 FIRE-STOPS AND SEALS

A. Penetrations through fire rated assemblies shall be sealed by a UL approved fire stop classified for an hourly rating equivalent to the fire rating of the assembly.

1.12 TAGS AND CHARTS

A. Each group mounted light switch, disconnect switch, mag starter, electrical cabinet, lighting and power panel and piece of apparatus shall be provided with a plastic tag securely fastened.

B. Equipment shall be numbered according to the equipment schedules on the drawings. Directories indicating number, location and use of each circuit shall be located at each panel, switchboard or motor control center.

1.13 OPERATING INSTRUCTIONS

A. Upon completion of all work and testing, operate the system and equipment for a period specified under each applicable section of this division. During this period, instruct the Owner in the operation, adjustment and maintenance of all equipment. Instruction schedule shall be coordinated with the Owner.

1.14 ADJUSTING AND TESTING

A. After all equipment and accessories are in place, they shall be adjusted and subjected to operating tests to assure proper adjustment and satisfactory and complete operating condition.

1.15 GUARANTEES

A. Guarantee all materials and workmanship for a period of one year from the date of final acceptance by the Owner.

B. During this guaranteed period, all defects developing through materials or workmanship shall be corrected immediately without expense to the Owner.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

DIVISION 16
SECTION 16050
BASIC MATERIALS AND METHODS FOR BUILDING ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. The intent of this section of the specifications is to establish a standard of quality and performance for basic materials and methods used in building electrical systems and not to name the particular or exact materials or products to be used.

1.02 GENERAL REQUIREMENTS

A. All materials and equipment required for the work shall be new, of first class quality, and shall be furnished, delivered, installed and finished in every detail.

B. All material shall be of a type which is currently manufactured as a standard and accepted product, commonly available through normal suppliers.

C. All material and equipment shall be installed by experienced, skilled tradesman under proper supervision. All materials shall be installed using commonly accepted methods.

D. Provide and install UL approved fire and / or smoke seals for conduit, piping etc., passing through fire and /or smoke rated construction.

1.03 WORK INCLUDED

A. Furnish all labor, material and equipment to construct all the electrical systems.

B. Include all incidental and miscellaneous material, supports, bases, protection, finish work, testing Adjusting, balancing and other work necessary to make the installation complete and operational.

C. Supply all necessary supervision and coordination with any other trades which are to provide work related to the electrical installation. If the electrical contractor is to install items which he does not provide, he shall include for such items the coordination of their delivery.

D. Wherever Contractor appears in this section, it shall mean the Contractor installing the electrical systems and not the General Contractor.

E. The electrical work includes but is not limited to the following:

1. Switches, receptacles, conduit, raceways and branch wiring
2. All power wiring for mechanical equipment furnished and installed by other trades
3. Telephone/Data system.
4. Emergency lights and exit signs
5. Fire alarm system
6. Maximum possible participation in Northeast Utilities Energy Programs
7. Power Generator System

2.02 CONDUITS AND RACEWAYS - MATERIALS AND METHODS

A. Materials:

1. Rigid Galvanized Steel Conduit (RGS) shall be hot-dipped galvanized steel with chromate finish, UL labeled, and conforming to Fed. Spec. WWC-581 and ANSI C80.1.
2. Intermediate Metallic Conduit (IMC) shall be hot-dipped steel with chromate finish, UL labeled, manufactured in accordance with UL 1242, and conforming to Fed. Spec. WWC-581.
3. Electrical Metallic Tubing (EMT) shall be thinwall, hot-dipped galvanized steel with chromate finish, UL labeled, and conforming to Fed. Spec. WWC-563 and ANSI C80.3.
4. Rigid Non-Metallic Conduit (PVC) shall be UL labeled, rigid, Schedule 40 PVC, and shall used with standard PVC couplings, fittings and boxes, and a solvent cement specifically intended for use with PVC.
5. Flexible Metallic Conduit (FMC) shall be galvanized, single strip, spiral wound steel with continuous copper bonding conductor, shall be UL labeled and conform to Fed. Specification WWC-566.
6. Liquidtight Flexible Metallic Conduit shall be constructed with a galvanized, spiral wound steel core with continuous copper bonding conductor and an extruded, UV resistant, thermoplastic steel covering.
7. Wireways shall be constructed in accordance with UL 870 for "Wireways, Auxiliary Gutters and Associated Fittings".

B. Minimum Sizes:

1. Conduit and EMT, 3/4"
2. Flexible Metallic Conduit, 1/2"
3. Wireway, 4" x 4"

C. Methods:

1. All wiring shall be installed concealed in ceilings, walls, slabs, pipe chases and furred spaces whenever possible. Conduit may be installed exposed only in Mechanical Room, Electrical Room and Janitors closets or areas with open ceilings, e.g. Apparatus Bays. Concealed conduit shall be installed in a direct line, with bends as long as practicable. Exposed conduit shall be installed parallel to or at right angles with the lines of the Building, as closely as possible to walls, ceilings, columns and other structural parts, consistent with proper space for access to boxes and so as to occupy a minimum of space. Where exposed conduits are grouped, they shall be run parallel and equally spaced.

2. Surface mounted raceways shall be limited to special applications only (i.e. bench-top multiple power outlets, desktop multiple phone jack strips, etc.)

3. Conduits shall be secured using approved galvanized accessories. Conduit supports shall be a minimum of 10' feet on center and shall be located as stated in the NEC.

4. Provide a #12 nylon pull string with identification tag at both ends, in every empty conduit run.

5. The ends of all conduits shall be cut square and reamed. Grounding bushings shall be provided at panel connections.

6. Conduits crossing building expansion joints shall be furnished with UL approved expansion couplings.

7. Conduit penetrations through walls, floors or ceilings in heated and unheated areas shall be sealed.

8. Conduits passing through built-up roofs or waterproof membranes shall be installed with flashing and pitch boxes in order to provide watertight joints. Fire-stops shall be used wherever conduits penetrate a fire rated assembly.

9. Pull boxes shall be installed so that the maximum distance between boxes is the equivalent of two 90 degree bends.

10. Seismic restraints designed and constructed to resist horizontal movement in any direction shall be installed on all suspended conduits 2-1/2" in diameter or greater.

11. Rigid Galvanized Steel (RGS) - Shall be used for wiring in:

    a. All mechanical rooms and exterior walls.

    b. Buried raceways in concrete slabs (except for main services which shall be PVC conduit concrete encased ductbank) or in the ground. Where directly buried, two coats of asphaltic compound shall be applied.

    c. Interior high voltage runs.

    d. Exposed exterior raceways.

    e. Any raceway in hazardous areas.

    f. Termination of ductbank runs through concrete and into equipment of indoor areas.

12. Polyvinyl Chloride Conduit (PVC) may be used for wiring in the following locations, unless specifically noted otherwise:

    a. Underground primary or secondary service ductbank encased in red concrete, rigid galvanized steel elbows shall be used where the conduit is run through concrete slab. Also a separate grounding conductor with green insulation shall be provided in these runs.
    b. Buried underground or under building slabs for panel feeders.
    c. Buried underground for communications wiring and all site light wiring.
    d. Underground telephone service ductbank encased in concrete.
    e. Outside wiring when installed below concrete slabs installed on grade.
    f. Lightning protection down leads, and individual ground conductors.
    g. All elbows, sweeps and vertical risers shall be RGS when PVC is used for wiring.

13. Electrical Metallic Tubing (EMT) shall be used for exposed and concealed work, except as limited by the above requirements and the NEC. EMT shall be permitted for the following applications:

    a. Lighting and power branch circuiting home runs and for all branch wiring run concealed and exposed in finished areas
    b. Equipment and panel feeders
    c. Fire alarm, telephone, communications and special systems

1. Flexible Metallic Conduit (FMC) shall be used for all final connections to motors, transformers or vibrating machinery with an 18 inch maximum whip. Liquid-tight FMC shall be used in damp or wet locations.

2.03 CONDUCTORS AND CABLES - MATERIALS AND METHODS

A. General:

1. All building lighting and power conductors shall be rated at 600 Volts, be UL listed and carry the appropriate UL label.

2. All conductors #14 AWG and smaller shall be a single, solid strand, unless otherwise acceptable.

3. All conductors #12 AWG or larger shall be stranded wires in Concentric-Lux compressed or compact configuration.

4. The outer surface of each conductor and cable shall be continuously marked along the entire length to show UL label, conductor material, conductor size, insulation type and voltage rating.

   Multi-conductor cables shall also show the number of insulated conductors on the outer surface.

5. Conductor ampacities, operating temperatures and coverings shall conform to the ANSI/NFPA 70 and the NEC.

6. Neutral conductors for data systems shall be larger than the phase conductors.

B. Materials - Conductor and Cable Types:

1. Type THW shall be moisture and heat resistant thermoplastic, PVC insulated with no outer jacket for use in 75 degrees C maximum operating temperature in wet and dry locations (to be used for panel feeds).

2. Type THWN shall be moisture and heat resistant thermoplastic, PVC insulated with a nylon or equivalent outer jacket for use in 75 degrees C maximum operating temperature in wet and dry locations.

3. Type THHN shall be heat resistant thermoplastic, PVC insulated with a nylon or equivalent outer jacket for use in 90 degrees C maximum operating temperature in dry locations.

4. Type XHHW shall be moisture and heat resistant, cross-linked synthetic polymer insulated for use in 90 degrees C maximum operating temperature in dry locations and 75 degrees C maximum operating temperature in wet locations.

5. Type FEPB shall be heat resistant for use in 200 degrees C maximum operating temperature in dry locations. To be used for fire alarm wiring.

6. Type MC (metal clad) or interlocked cable shall be a UL labeled assembly with one or more conductors, with Type THHN insulation each individually insulated and enclosed in a metallic sheath of interlocking metal tape, or a smooth or corrugated metal tube.

C. Wiring Methods and Terminations

1. Unless otherwise indicated, circuits of different phase legs may be combined with a common neutral in home runs to the same panel. No more than three circuits are permitted in one conduit or cable.

2. All branch wiring #6 and smaller shall have color coded insulation. Solid color red, blue, black and white (neutral) shall be used for 120/208 Volt systems. Yellow, orange, brown and gray (neutral) shall be used for 480/277 Volt systems. Green shall be used only for all equipment grounds. White shall be used only for neutrals.

3. Wire sizes shall be no smaller than the following minimum:

   a. Lighting and Power Wiring: #12 AWG with 600 Volt insulation
   b. Control Wiring at 24 Volts: #16 AWG with 600 Volt insulation
   c. Control Wiring at 120 Volts: #12 AWG with 600 Volt insulation

4. All wiring for fire alarm systems shall be rated for 200 degrees C.

2.04 SPLICES

A. Solid conductor splices for #10 or smaller wires shall be made with UL listed solderless connectors. Wiring nuts will not be permitted. Stranded wire conductor splices for #10 or smaller wires shall be crimp type.

B. Splices, cable taps and terminals for #8 and larger wires shall be made with UL approved compression connectors applied with special tools according to manufacturer's recommendations, or bolted pressure connectors of bronze or copper construction.

2.05 CIRCUIT OR CONDUCTOR IDENTIFICATION

A. Phase rotation shall be indicated through the use of red, blue and black tapes applied near the ends of the wires or through similarly colored insulation.

B. Neutral conductors shall be identified with white tape near the ends or with white insulation. When more than one neutral conductor is run in the same conduit, each wire shall be distinguished at both ends with a color or number code.

C. Insulated grounding conductors shall be identified with green tape near the ends or identified with green insulation.

D. Cables shall be identified in manholes as to source and destination.

2.06 GROUNDING

A. All electrical systems shall be grounded and bonded in accordance with the NEC or as stated in these Specifications.

B. The electrical system, which includes switchboard and panel enclosures, transformer and motor frames, all metal conduit and raceways, metal enclosures (such as pull boxes, junction boxes or wireways), or enclosures for electrical devices, conductive, non current carrying material and other equipment, shall be made to form a continuous conducting, permanent ground path of low impedance to enhance the safe conduction of ground fault currents and facilitate the operation of the circuit protective devices within the circuit. The ground path between all grounded items shall be installed to prevent objectionable, continuous current flow over grounding conductors or grounding paths.

C. Exposed, non current carrying metal parts of fixed equipment likely to become energized shall be grounded.

D. Equipment grounding conductors shall be separate, solid or stranded copper conductors identified with green insulation. All grounding conductors shall be installed in conduit or as part of a cable assembly and shall be protected from physical damage.

E. Positive ground connections with the grounding conductors shall be made at each outlet box, lighting fixture, motor and other equipment components by means of a grounding clamp, screw or clip. Connections to grounding rods, building steel or other grounding electrode conductors shall be made with Cadweld type, exothermic weld process. Connections to pipes shall be made with acceptable clamps.

F. All conduit runs shall contain a separate equipment grounding conductor. Conduit shall not be used as the sole means of grounding. Equipment grounding conductors shall be separate, solid or stranded copper conductors identified with green insulation. All grounding conductors shall be installed in conduit or as part of a cable assembly and shall be protected from physical damage.

G. After the installation is completed, the entire wiring system shall be tested for grounds in

accordance with the requirements of the NEC and these specifications. Resistance to ground measurements shall be taken for the grounding electrode system and the results reported to the engineer.

H. Furnish and install a complete copper signal reference grounding grid system for data areas raised floors and isolated ground devices in accordance with FIPS Publication 94.

2.07 PANELBOARDS

A. The panelboards shall conform to NEMA Publication PB-1, be UL listed, and shall be complete with a hinged, locking metal door and a directory card. Panelboards shall have distributed phase bussing throughout. Where specific frame sizes, circuit breaker are listed, the NEMA standard interrupting rating for this frame shall be minimum. Top or bottom gutters shall be increased in dimensions as required for tap connections to feeders. Through-feed lugs shall be used to continue full size feeders where required. All panels rated at 100 Amperes and larger shall have a door-in-door cover. Provide all panelboards with 200% neutral bus bars.

B. All panelboards shall be furnished with lugs or main breakers, and any special devices as required. Multiple section panels shall have feed-thru lugs with full capacity taps to adjacent panel sections.

C. All panelboards shall be furnished with catch locks on the doors. All locks shall be keyed alike.

D. All branch breakers shall be rated for 75C, of bolt-on construction, quick-make, quick-break and have a common trip on all multi-pole breakers. Circuit breakers used for controlling lighting circuits

shall be UL rated for switching duty.

E. All panelboards shall have an equipment ground bus. An isolated ground bus shall be installed in all panelboards.

F. Backbox interiors, inside trim, door and exterior shall be treated with a rust inhibiting phosphalatized coating after pickling and finished in enamel, ANSI-61 gray or other color as may be designated in Section 09900, Painting.

G. In general, the panelboards shall be mounted so that top circuit breaker is no more than 6' feet above the floor.

H. All panelboard busses shall be copper.

I. All devices shall be fully rated. Series ratings for short circuit ratings are not acceptable.

J. A typewritten directory, eight inches by ten inches, with metal frame and clear plastic face shall be furnished and installed upon the inside of the door of each panelboard, indicating the room or area and the service controlled by each circuit.

K. Panelboards shall be initially designed to that they are not loaded more than 75%. Provide spare breakers and spare space.

2.08 CIRCUIT BREAKERS

A Branch circuit breakers shall be quick-make, quick-break, thermal magnetic type with visible trip position. All multi-pole breaker shall have a common trip. Do not use single pole breakers equipped with handle ties for multi-pole use.

B Branch circuit breakers shall be bolt-on type unless otherwise specified, and shall be UL listed.

C Branch circuit breakers with ground fault circuit interrupter shall be used where required by the NEC. GFI circuit breakers shall be provided for branch circuit overload, short circuit and ground fault interruption.

D Circuit breakers shall be rated for the voltage of the circuit on which they are used. Circuit breakers with 225 ampere or larger frame sizes shall have interchangeable trips.

E Locking tabs shall be provided on all circuit breakers serving emergency lighting, fire alarm system, security systems and other emergency or critical equipment.

2.09 LIGHT SWITCHES

A. All light switches shall be UL labeled, rated for 20 Ampere, 120/277 Volt operation, and be equivalent to the following specification grade:

B. Single-pole light switches shall be Hubbell #1221; 2- pole switches shall be Hubbell #1222; 3-way switches shall be Hubbell #1223; 4-way switches shall be Hubbell #1224.

C. Keyed light switches shall be 20 Ampere, Arrow-Hart Series #1191 with #1187 coverplate or acceptable equivalent.

D. Switches with pilot light shall be Hubbell #1221-PL with illuminated handle.

E. Weatherproof light switches shall be equivalent to Crouse-Hinds, Type DS128 cover with FS box and tumbler switch.

F. Dimmer switches shall be Lutron "Nova" Series or acceptable equivalent (1000W. minimum).

2.10 RECEPTACLES

A. All receptacles shall be 3-wire, rated for 20 Ampere operation and equivalent to the following specification grade:

1. Receptacles for general use (120 Volt) shall be 20 Ampere, duplex grounding type.
2. Receptacles for computer circuits shall be 20 Ampere (120 Volt) isolated ground, 2-pole, 3-wire type.
3. Weatherproof outlet shall be Hubbell #GF5362, mounted in a Crouse-Hinds FS backbox complete with WLRD cover plate or acceptable equivalent.

B. Personal ground fault interrupter type receptacles shall be Hubbell #GF5362.

C. Surface mounted multi-outlet system:

1. Multi-outlet systems shall consist of surface mounted metal raceways for use with number and type of wiring devices as required. Systems shall be complete with all fittings, etc.

2.11 WALL PLATES

A. All plates for switches and receptacles shall have brushed stainless steel finish, and be a minimum of .032" thick.

B. Plates on exposed conduit boxes shall be galvanized and zinc coated with rounded edges.

C. Plates for telephone wall outlet boxes shall be furnished with jacks for connection of telephone wiring and telephone. This equipment must be coordinated with the Agency's telecommunications personnel.

2.12 PULL BOX AND CABINET ENCLOSURES

A. Units shall be steel, NEC approved, UL listed, have a gray, baked enamel finish, and be provided with knock-outs for the size of the conduit to which they are connected. Boxes shall be galvanized steel where specifically noted.

B. Hinged cover, single door units shall have formed hinges, flush ring handle and friction catches on 14- and 16-gauge enclosures on units up to 18" x 18". Units larger than 18" x 18" and all 10- and 12-gauge enclosures shall be furnished with butt hinges, padlock hasp and staple.

C. Enclosures which are recessed in finished walls shall be constructed of steel, finished with baked enamel and furnished with conduit knockout holes, and flush combination trim cover and door assembly, 2" higher and 2" wider than the box dimensions.

2.16 OUTLET AND JUNCTION BOXES

A. Outlet boxes for light fixtures in concrete walls or slabs shall be 4" octagonal mud boxes not less than 2-1/8" deep. Include fixture studs where required.

B. Switch and receptacle outlet boxes in masonry walls and partitions where wiring is concealed shall be standard 4" square, 1-1/2" deep, galvanized, with extension cover for the particular device they will receive. Use plaster extensions not less than 1/2" deep for boxes installed in plastered walls or cast in concrete. Use 1-1/2" deep square corner tile wall extension for boxes installed in tiles, exposed brick or exposed block masonry walls. Outlet boxes in existing masonry walls shall be furnished with switch box extensions. Surface mounted raceways, switches or outlets are not acceptable in finished spaces other than mechanical, electrical or janitorial closets.

C. Switch or receptacle outlet boxes or fixture outlet boxes where conduit is exposed shall be Crouse-Hinds Type FD, or equivalent, with covers to fit devices used. See Specification paragraph dealing with wall plates.

D. In accordance with the NEC, pull boxes shall be of adequate size to accommodate the conductors installed therein.

D. Coordinate outlet height / locations for kitchen areas to support all Agency – supplied appliances.

2.17 HANGERS AND SUPPORTS

A. Individual conduits shall be supported by means of hangers of acceptable design placed not more than 8'-0" on center.

B. Parallel groups of conduit shall be supported by means of horizontal angle or channel systems, equivalent to Unistrut, below the conduit with vertical hanger rods at both ends. Individual conduits shall be held in place by single hold malleable clips.

C. Supports for conduits or raceways on concrete masonry walls may be attached to walls with all metal expansion shields. Support systems shall meet requirements for seismic loads. Explosive type inserts will not be allowed.

D. All hangers, clips and accessories for supporting conduit shall be UL listed.

E. A 3/4" plywood backboard shall be used for mounting all surface mounted disconnect switches, starters and other equipment. Backboards shall be given 2 coats of fire resistant black paint on all sides before installation.

2.18 SLEEVES AND INSERTS

A. Sleeves through outside walls shall be cast iron with intermediate, integral flange. Sleeves shall be set with ends flush with each face of the wall. The space between sleeve and conduit shall be sealed watertight.

B. Sleeves through concrete floors or interior masonry walls shall be Schedule 40 black steel pipe set flush with finished walls or ceiling surfaces, but extending 2" above finished floors.

C. Sleeves through interior partitions shall be 22-gauge galvanized steel set flush with finished surfaces or partitions.

D. Inserts shall be individual or strip type, of pressed steel construction and with accommodation for removable nuts and threaded rods up to 3/4" diameter to permit lateral adjustment.

2.19 NAMEPLATES

A. Nameplates shall consist of laminated black and white plastic with 5/16" engraved white letters on black background.

B. Nameplates shall be securely attached in place by sheet metal screws.

C. Plastic coated wire markers of the wraparound, self-adhesive type with factory printed numbers, letters and symbols shall be used to identify all feeders, mains and branch circuit conductors.

2.20 SAFETY SWITCHES

Safety switches shall be UL listed, heavy duty, and be equivalent to the following General Electric types:

A. Fused 2- and 3-pole safety switch: Type TH

B. Non-fused safety switches: Type THN

C. Fused or non-fused outdoor type (WP) safety switches in NEMA 3R enclosures: Type TH or THN

D. Fused or non-fused safety switches with water and dust tight NEMA 4 and 4X stainless steel enclosures: Type TH or THN

E. Fused or non-fused safety switches with drip and dust tight NEMA 12 enclosures: Type TH or THN

F. Fused switches which accept Class R fuses shall be furnished with Class R fuse rejection kits

2.22 LIGHTING CONTACTORS

A. Furnish and install mechanically held lighting contactors, mounted in NEMA 1 enclosures unless otherwise noted.

B. Lighting contactors to be as manufactured by ASCO 917 Series or Square "D" or Westinghouse.

2.24 SWITCHBOARD

A. Provide a multi-section circuit breaker switchboard with main and feeder breakers, customer metering. Main circuit breaker to be rated for 100% continuous duty.

B. The switchboard shall be designed to meet the needs of all equipment and built and tested in accordance with NEMA PB-2 and UL 891.

C. Switchboard shall fully integrate with the UPS and emergency power systems if applicable.

D. Provide ground fault protection, single phase protection and lightning protection on main circuit breakers.

E. Provide voltmeter and ammeter with phase selector switch.

F. The main horizontal and vertical bussing shall be copper with a fully rated copper ground bus run the entire length of the switchboard.

G. Spare capacity: Provide a minimum 25 percent spare capacity and circuit breaker space.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

DIVISION 16
SECTION 16510
LIGHT SYSTEMS

PART 1 - GENERAL

1.01 COMPLIANCE

A. Comply with NEC for installation and construction of interior and exterior building lighting fixtures.

B. Comply with requirements of NEMA Standards Pub/No.'s LE 1 and LE 2 pertaining to lighting equipment.

C. Comply with IES RP-1 pertaining to interior lighting fixtures.

A. Comply with UL standards. Provide interior and exterior lighting fixtures and components which are UL listed and labeled.

B. Provide fluorescent lamp ballasts which comply with Certified Ballast Manufacturers Association standards.

C. Provide lighting equipment in compliance with the Utility Companies Energy Programs.

1.02 SUBMITTALS

A. Submit manufacturer's technical product data on lighting fixtures in booklet form with separate sheet for each fixture, assembled in luminaire "type" alphabetical or numerical order, with proposed fixture and accessories clearly indicated on each sheet.

PART 2 - PRODUCTS

2.01 INTERIOR LIGHTING FIXTURES - GENERAL

A Provide complete lighting fixtures with concealed hinges and catches, with metal parts grounded as common unit, and designed to dampen ballast generated sounds.

B Lighting equipment shall be furnished and installed, complete with lamps, lenses, glassware and accessories and be ready for operation. Damaged fixtures shall be replaced.

C All ferrous metal surfaces of fixtures and plaster frames shall be treated with rust inhibitor and finish coat adherence properties. Finish coats shall be synthetic baked enamel.

D. All ballasts and lampholders shall be Electrical Testing Laboratories (ETL) and UL approved.

E. A 12-gauge safety wire shall be run from each corner of each fixture and be connected directly to the building structure. Grid clips shall be used to secure the fixture directly to the grid.

F. Ceiling mounted surface or pendant fixtures shall be screw mounted to backboxes, which are securely attached to building structure. A 12-gauge safety wire shall be run from the back box directly to building structure.

G. Recessed downlights shall be supported by the grid using hanger bars and T-bar mounting clips. A 12-gauge safety wire shall be run from each recessed fixture and connected directly to building structure above.

H. Where A lamps, R lamps or Par reflector lamps are specified, the contractor may make moderate changes in types of lamp; e.g., from spot to flood or 100 Watt to 75 Watt, if approved, at no additional cost to the Owner.

I. Fasten fixtures to structural supports.

J. Support surface mounted fixtures longer than 2' at an additional point besides outlet box.

K. Upon completion of installation of interior lighting fixtures, and after building circuitry has been energized, demonstrate capability and compliance with requirements. Repair or replace damaged fixtures and retest.

L. Replace defective and burned out lamps for a period of one year after completion.

M. Provide equipment grounding connections for interior lighting fixtures as indicated. Tighten connections to comply with UL torque specifications.

N. Furnish extra lamps amounting to 15%, but not less than one lamp, of each type and size lamp used in each type fixture. Deliver as directed to Owner's storage space.

O. All interior fixtures shall be on circuits controlled by occupancy sensors or multiple switching.

P. Fluorescent fixture housings shall be a minimum of 22 gauge rust protected steel, or a minimum of .125" aluminum.

Q. Prismatic lenses shall be 100% virgin acrylic, minimum .125" thick.

R. Parabolic louvers shall be 9 cell, semi-specular, anodized aluminum with a minimum thickness of .025", 3” deep, and permanently de-staticized to retard dirt accumulation.

S. The following illumination levels are recommended. Illumination levels referenced are maintained levels measured at a 30” height from the floor or at an actual work surface and represent an average level for the area. Levels as given, are as a general guide only and any deviations or special applications shall comply with latest IES standards.

Area/Room Name	Maintained Foot Candles
Offices & Secretarial Areas	55-60
Study Areas & Classrooms	50-60
Conference Rooms & Meeting Rooms	40-50
Multi Purpose/Auditoriums	35-50
Corridors & Stairwells	15-20
Lobbies, Lounges/Receptions	30-35
Mechanical, Electrical, Telephone & Elevator machine Rooms	25
Receiving Areas	30
Storage Areas	10-15
Restrooms & Locker Rooms	25-30
Temporary site lighting for security	1-3
Walkways for pedestrian security	2-2.5
Parking Lots	1-1.5
Apparatus Bay	30

2.02 LIGHTING FIXTURES:

A. Interior Lighting:

1. Energy efficient fluorescent fixtures are preferred.
2. Provide static recessed type fluorescent fixtures, 2’ x 2’, to allow minimal maintenance stock. Fixtures shall be recessed in suspended ceiling locations and surface mounted to structure elsewhere as indicated.
3. Provide parabolic louvers in all offices, toilet rooms, break-rooms and public spaces. Prismatic lens fixtures are allowed in storage and mechanical rooms.
4. Emergency exit signs shall utilize light emitting diodes as the light source.

2.03 WIRING

A. Provide electrical wiring within fixture suitable for connecting to branch circuit wiring as follows:

1. NEC Type AF for 120 volts, minimum No. 18 AWG.
2. NEC Type SF-2 for 277 volts, minimum No. 18 AWG.

2.04 FLUORESCENT LAMP BALLASTS

A. Provide proper energy saving electronic type fluorescent lamp ballasts with high power factor, rapid start, and low noise features; Type 1; Class P; sound rated A; equal to Advance Mark V and Advance Mark VII for dimming.

B. Fluorescent ballasts shall be rapid-start. Two-lamp and single lamp ballasts shall be used, no three-lamp ballasts will be allowed. All ballasts shall have high power factor (over 90%), of the “watt reducer” type and shall have ETL-CBM certification, U.L. listed, premium grade, class P, non-PCB and sound rated “A”. Case temperature shall not exceed 90° C during normal operation in 30° ambient.

C. Provide low temp or remote ballasts where fixtures will be subject to cold temperatures.

2.05 HIGH-INTENSITY-DISCHARGE LAMP BALLASTS

A. Provide HID energy saving lamp ballasts, capable of operating lamp types with ratings indicated; reactor type, high power factor, core and coil assembly encapsulated in non-melt resin; install capacitor outside ballast encapsulation for easy field replacement. Ballasts to operate lamp within the lamp's power trapezoid requirements.

2.06 LAMPS

A. Provide energy saving fluorescent T-8 and compact lamps, clear/phosphor coated metal halide, and high-pressure sodium lamps. Fluorescent lamps shall be 32 watt, T-8, 3500 K, rapid start, warm white. U-tube lamps are not acceptable.

2.07 LIGHTING CONTROL

A. Occupancy sensors shall be utilized for interior lighting control for energy conservation. Sensors shall not be used in areas such as corridors, public areas, lobbies, mechanical & electrical rooms and any other area where a safety hazard may be created by lights going off automatically.

B. The use of multiple switching shall be evaluated for each space and condition. Where possible, switching shall be used to effectively reduce artificial lighting near windows, permit light reduction for non-critical tasks and during partial occupancy and reduced lighting for custodial activity.

C. Dimmable fluorescent or H.I.D. lighting must be approved by the Project Coordinator before design of the system.

END OF SECTION

DIVISION 16
SECTION 16770
TELEPHONE/DATA SYSTEM

PART I. GENERAL

1.01 SUMMARY

A. This specification covers general conditions for the telephone/data system with integrated. Telecommunications wiring and equipment is included in this specification or this contract.
   1. Location of the telecommunications distribution points to be located by the Agency telecommunications personnel.

1.02 GENERAL REQUIREMENTS

A. All materials and equipment required for the work shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail.

B. All material shall be of a type which is currently manufactured as a standard, accepted product and commonly available through normal suppliers.

C. All material and equipment shall be installed by experienced, skilled tradesman using commonly accepted methods and shall be of a quality consistent with good trade practice.

1.03 WORK INCLUDED

A. Furnish all labor, material and equipment to construct the telephone/data wiring system .

B. All material shall include all incidental and miscellaneous items, supports, bases, protection, finish work, and other work necessary to make the installation complete in all respects and fully ready for installation of equipment.

C. Supply all necessary supervision and coordination information to any other trades which are to provide work to accommodate the installation.

D. The telephone/data work includes but is not limited to the following:

   1. Provide a complete telephone/data distribution conduit system including but not limited to dual service entrance raceways for service cables to enter the main distribution frame(MDF), interior distribution conduits to intermediate distribution frames (IDF's), conduits to the Control Room, conduits with Category 5E cable to outlet boxes. Telephone/data jacks and plates and wiring to be included.

   2. Provide all voice/data conduit, cable, and boxes for the complete telephone and data distribution system.

   3. The telephone/data system shall provide two runs of Category 5E cable from each jack back to the communications closet.

PART 2 - DESIGN CRITERIA

2.01 GENERAL

A. The following design criteria are guidelines for the installation of the telephone/data conduits required for this facility:

B. Telephone data system shall be designed and laid out in accordance with the following wiring standards:.

1. ANSI: The National Commercial Standard

a. ANSI/EIA/TIA-568-1991 and FIPS 174, Commercial Building Wiring Standard
b. ANSI/EIA/TIA-569-1990 and FIPS 175, Telecommunications Pathways and Spaces
c. ANSI/EIA/TIA-570-1991 and FIPS 176, Residential and Light Commercial Wiring
d. Proposed ANSI/EIA/TIA Standard 607 and FIPS (Draft FED-STD-1093) Grounding and Bonding Requirements
e. Proposed ANSI/EIA/TIA Standard 606 and FIPS (Draft FED-STD-1094) Administration Standard for the Telecommunications Infrastructure

2. Federal Information Processing Standards. (FIPS)

a. Department of Commerce: National Institute of Standards and Technology
b. Department of Defense: National Communications System

3. FIPS apply to the State of Connecticut.

4. BICSI (Building Industry Consulting Service International) Telecommunications Distribution Methods Manual, A Guide to Design and Effective Utilization

C. Data/Telephone outlets shall be provided in each office area, meeting room, training room, data support areas.

D. Coordination prior to start of construction contractor coordination shall submit shop drawings indicating layout of outlets as they relate to furniture plans.

E. WIRES AND CABLES

1. VOICE/DATA Wiring: The Contractor shall install voice/data wiring using 4-pair, category 5e or higher wiring at the Contractor Installed Sites (CIS) in accordance with the Commercial Building Telecommunications Cabling Standard (TIA/EIA-568-B) for installation of that cable plant. Registered Jacket type 45 (RJ45) will be used for terminating cable end. The contractor shall install miscellaneous equipment such as patch panels, racks and/or cabinets as required, and coordinated with Project Manager.

2. Contractor shall provide electrical power outlets for supporting communications panels or cabinets. Voice/data wiring will be accomplished by installing wiring within walls, or above ceilings. Any proposed wiring on interior wall surfaces, or on wall with surface mounted conduit must be reviewed with project manager prior to installation..

3. Inter-Building Connectivity: Contractor shall install inter-building, vertical or riser cable connections with 12 strands (6pr) multi-mode 62.5/125 fiber. Single-mode fiber will be install for close circuit video from primary communication closet to Main Distribution Facility (MDF) and Intermediate Distribution Facility (IDF) of each building.

4. Wire Colors: Primary color for CAT 5e is blue. Alternate color is white.

5. Labeling and Identification: The Contractor shall provide detail labeling and identification for each MDF, IDF, racks and components, patch panel, and data drops. Data Jack labeling must show which MDF or IDF it is connected to [(i.e. IDF11-001U) IDF11 means IDF #1 on first floor, 001 means first data jack off IDF11]

6. Distribution: All line voltage and low voltage cable shall be install in conduit to the locations needed.

7. Testing /Results: The Contractor shall test all wires, cabling, and fiber. Contractor shall provide detailed and full wire map, including length, dB loss and attenuation per Cat 5E run. Fiber optic testing must include continuity and link loss performed at both operating wavelengths for certification, 850/1300/1310/1550nm.

8. Rack Dimension: The Contractor shall install 84" H x 19" W racks in each MDF and IDF. Rack must be at least 6 inches perpendicular to wall, also allow for a minimum of 36 inches front and back access.

9. Power Requirement: Each new facility should have dedicated uninterruptible power supply (UPS) to provide at least twenty-four hour service. The Contractor shall install one quad outlet on each comm. closet wall plus one 30-amp outlet within 36 inches of rack.

10. Grounding: All panel boards, receptacles, conduit, relay racks, and cable tray installed for CTARNG equipment shall be properly grounded or bonded (per NEC) to building steel or a separate grounding point meeting NEC requirements. The Contractor will be responsible for assuring that communication closet components are properly grounded to a ground point in each hub room.

PART 3 - EXECUTION

A. Dual underground service with two 4" raceways each from the telephone data source (pole) to the main service room and to the main distribution frame.

B. Interior distribution system with two 4" raceways to each intermediate distribution frame and two 4" raceways to the Control Room from the main distribution frame.

C. Telephone data terminal backboard shall be constructed of 3/4" fire rated plywood with 2 coats of black fire retardant paint. Furnish and install two 20 Ampere quadraplex receptacles each wired to a dedicated 20 Ampere, 120 Volt circuit. Provide a designated #6 equipment grounding wire run to the nearest water service or other grounded system, and connected to a 6" copper terminal strip located in each IDF & MDF Room.

D. Telephone data outlets shall consist of an outlet box, jack plate and a 1" conduit with cable, stubbed and bushed, and run to back to the telecommunications room. Provide an additional pull string in each conduit.

END OF SECTION